ELECTRICAL REVIEW

February 2, 1945

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EDITORIAL, ADVERTISING & PUBLISHING OFFICES : Dorset House, Stamford St., London, S.E.1

Telegraphic Address : "Ageekay, Sedist, London." Code : ABC. Telephone No. : Waterloo 3333 (35 lines).

Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Annual Subscription, Post free : British Isles, £2 7s. 8d. ; Canada, £2 3s. 4d. ; Elsewhere, £2 5s. 6d.

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVI. No. 3506. FEBRUARY 2, 1945 9d. WEEKLY

Professional Appointments

Bureau's Relations with Other Organisations

THE Professional Engineers' Appointments Bureau has now been officially launched by the Presidents of the Institutions of Civil, Electrical and Mechanical Engineers in an appeal to members for the funds to keep it going until it becomes self-supporting. A project which is so likely to produce visible practical results should commend itself to those addressed and there should be no difficulty in raising the £10,000 which is considered necessary. Donations from members of the Institutions should be reinforced by funds from engineering employers to whom also an appeal is being made.

Departure from Tradition

In a way this Bureau represents a remarkable departure from the tradition of the Institutions that their purpose was to advance their respective branches of engineering science and practice and not to find jobs for their members. It may be said, of course, that membership has been of considerable help in securing appointments and it is also true that the Institutions have actively participated in the work of the Central Register. Although the Bureau's activities will be extra-Institutional, the fact that its Board will include the Presidents and Secretaries of the Institutions makes it truly representative of those bodies.

The rules make no provision for securing that appointments shall carry reasonable remuneration. Only a trade union can successfully achieve this very desirable object and the Bureau is emphatically not a trade union. There is always the possibility, however, that a hint could be dropped if it were considered that a would-be employer was offering too little to secure the right man for a post, and employers might occasionally welcome some guidance in a matter which is not always easy to settle. Possibly, as regards remuneration, contact could be established with existing professional engineers' Associations, *e.g.*, the E.P.E.A. and the A.S.E.E. in the electrical sphere. In this connection another point arises.

The scheme is for the benefit of members of the Institutions " or persons whose engineering qualifications for election or admission to one of those bodies have been approved by their respective Councils." It is suggested in the January *Journal* of the E.P.E.A. that " the proposals of the three Institutions require more adequate discussion and investigation, particularly by representatives of engineers who may not be included in their membership," and the facilities accorded to such representatives by the Hankey Committee are referred to.

Industrial Basis Proposed

The E.P.E.A. contends that operations should be on an industrial basis and not solely in respect of Institution membership, and considers that " many engineers . . . would prefer the centralised scheme advanced by Lord Hankey's Committee." The Association seems to fear that the Bureau will compete with other agencies to the detriment of men who are not members of the Institutions. We do not know whether this fear is justified, but we take the view that the Bureau will be principally concerned with engineers who are not included in such a well-defined and

organised branch of engineering as that represented by the E.P.E.A. It has been stated that the Bureau will co-operate with the Ministry of Labour in the machinery which is being set up for guiding and planning the redistribution of technical man-power. So far as we can see there is nothing in the rules to preclude consultations with other interested bodies. It is a subject worth looking into, particularly where these bodies include a good proportion of Institution members.

Peak-load Cuts

THE warning that it might be necessary to cut off electricity supplies at the time of the morning peak load has been followed by widespread cuts upon several recent days and industry has been asked to reduce its consumption by 10 per cent. In the recent severe weather, abnormally prolonged, the stoppage of supply, although inevitable, has been somewhat painful. The Brighton trolley-bus system was out of action for about a quarter of an hour on Friday last, but transport services generally have not been much affected and the local distributors have avoided as much as possible any interference with the supply to hospitals, etc. In some cases the layout of the system has made it impossible to discriminate between essential and non-essential services and consequently in some sections either all have been cut off for a short time or they have been continued, to the advantage of any domestic consumers who happened to be included.

Enlightened Self-Interest

THAT the main responsibility rests with industrialists of securing the requisite supply of properly trained mechanically minded recruits for the electrical industry was probably the most important point developed in the resumed I.E.E. discussion on further education. The provision not only of facilities for the educational advancement of apprentices but also of teachers, in order that technical colleges may be closely linked with practical work, should prove a remunerative long-term policy. This applies with especial force to craftsmen, who have to be obtained for an electrical industry that expands rapidly out of a population that tends to do the opposite. No return to 1939 standards can be contemplated if the industry is to secure a fair share of international trade.

Grit and Ash

ILL effects upon the efficiency of operation are not the only worry of the electricity supply engineer resulting from the decline in the quality of coal supplied to power stations. In some areas grit emission is increasing and the ash-handling equipment is inadequate to cope with the increased load upon it. These points are referred to in a report which Mr. H. A. Nevill, electrical engineer of Peterborough, has presented to his committee. Mr. Nevill says that whereas the ash content of coal bought in pre-war days varied between 2·2 and 6·26 per cent., nowadays the minimum was 3·8 per cent. and the maximum as much as 28·36 per cent. As a result the ash-handling plant, on an average, had to deal with 2½ tons an hour against 0·68 ton before the war. Mr. Nevill pins some hope of improvement upon a promise of the Area Committee that a "somewhat better" quality of fuel is to be supplied.

Plant for South Africa

IN a report, quoted in the *Electrical Review* of November 17th last, the city electrical engineer of Pretoria seemed to consider that there was indefinite delay in securing urgently-needed generating plant from the United Kingdom and that this difficulty would persist. We are consequently glad to hear from the Board of Trade that the situation is not so hopeless as was suggested. Permission for the production of the Pretoria plant was given in September and since then the production of a considerable amount of other generating plant for South Africa and other overseas markets has been approved. Although the call upon our manufacturing resources is great and home demands press, we must at all costs make it unnecessary for our export customers to contemplate looking elsewhere for their needs.

Future Requirements

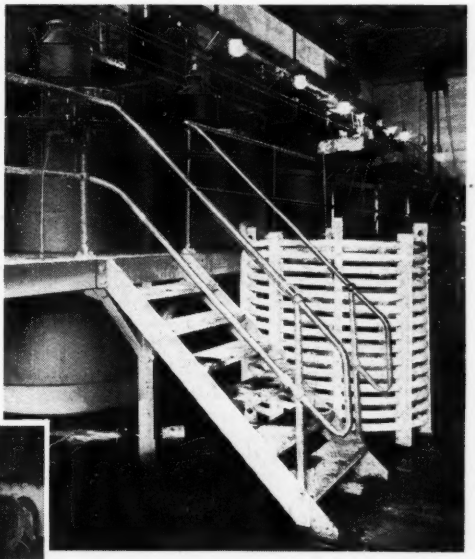
THIS is confirmed by a statement by the High Commissioner for South Africa in which the sanctioning of the production of 186,500 kW of plant for installation by 1947 is mentioned. At the same time it is stated that a committee has been set up in South Africa to survey present and future electrical plant requirements which should enable contracts to be placed early and to be proceeded with in the order of their importance.

Making T.N.T.

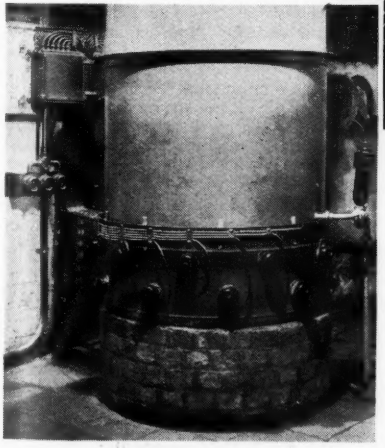
Electrical Aspects of a Large Factory

THIS article records from the electrical viewpoint our main impressions of a recent visit to a factory engaged solely on the manufacture of the high explosive T.N.T. The raw product is toluol which enters the factory in tank cars from which it is pumped to large storage tanks by means of a 5,000-gal. per hr. centrifugal pump. This pump is housed in its own brick chamber at the off-loading bay and is directly driven through a wall sealing gland by a 5-HP, 1,450-RPM, Lancashire Dynamo & Crypto flame-proof squirrel-cage motor which is served by a star-delta M. & C. flameproof starter also outside the building.

The toluol is drawn from the storage tanks and pumped into service tanks at the first nitrating house where it is fed through a rotameter into nitrating vessels and combined with a mixture of sulphuric and nitric acids. In each of the nitrating vessels is a vertical bucket stirrer which is belt-driven from a shaft representing a common drive for several nitrators. This shaft is driven by a 20-HP, 1,450-RPM slip-ring motor, located outside the building, the belt transmission from which results in a shaft speed of 150 RPM. There is an even-ratio belt transmission from the shaft to each nitrator, where there is a 3 to 1 reduction gear serving the actual stirrer. Each nitrator is equipped with two lead coils through which cooling water is passed to a tank under the control of an Evershed no-float control system which returns the water to a cooling tower. Fume from these nitrators is passed to absorption towers which are served by a simple fan directly coupled to a 7-HP, 1,400-RPM L.D.C. flameproof squirrel-cage motor with direct-on starting.



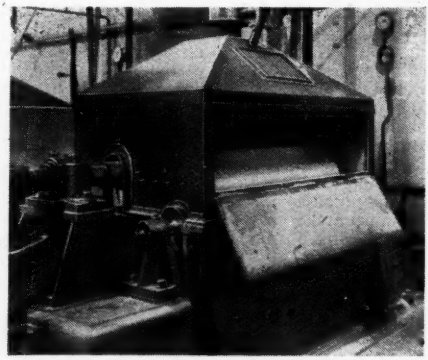
Stirrers in the nitrating vessels are group driven



The expansion-engine driven dynamo is loaded by means of immersion heaters

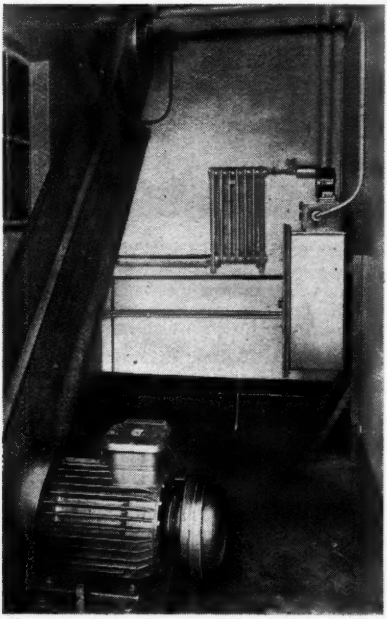
The chemical reaction during the process changes the toluol into M.N.T. (mono-nitro-toluene) which, after separation from the weak acid, is pumped to another nitrating house and again combined with mixed acids and chemically changed to T.N.T. (tri-nitro-toluene). The nitrators in this second nitrating house are also equipped with agitators, and one 10-HP, 925-RPM L.D.C. slip-ring motor group drives a number of equipments, firstly by belt to a line-shaft running at 150 RPM, and then through bevel gears to the stirrer shafts above the nitrators. The molten crude T.N.T. is next transferred to the washing house where acids

and other impurities are removed from it. The washing machines are driven by a 25-HP, 975-RPM flameproof slip-ring motor with a slip-ring short-circuiting arrangement separate from the washers. The transmission scheme is first by belt to a 150-RPM shaft which extends through the wall *via* a sealing gland and has secondary belt transmission on to bevel gear units on the paddles of the machines. The motor is remotely controlled by push-button units which are situated near the washing machines, and these operate contactor equipments fixed in the motor house.



In the flaking machines the molten T.N.T. solidifies on the phosphor-bronze revolving drum

After cleansing processes the T.N.T. is passed to the finishing buildings where it is dried by air agitation in large cylindrical tanks in which the explosive is heated by steam coils and at the same time agitated by compressed air, and then flaked or cast into biscuit form. In each flaking machine the liquid T.N.T. is picked up by contact with a water-cooled revolving phosphor-bronze drum on which it solidifies. A lever-weighted knife bears on the drum and shaves off the solidified T.N.T. rather like soap flakes. A 10-HP, 1,440-RPM L.D.C. flameproof slip-ring motor serves each pair of flaking machines whose shafts extend through the wall to the motor room *via* a gland wall bearing, each shaft being earthed at this bearing by a slip-ring and brush outfit with the tail of the brush connected directly to the factory earthing system. There is a belt transmission with about 1½ to 1 ratio to a worm gearing on each shaft which creates a right-angle transmission and provides a drum speed at the machines of about 10 RPM.

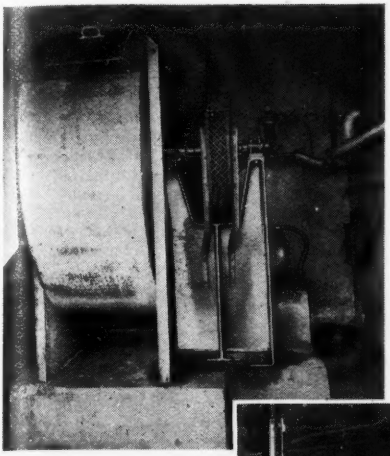


The flaking machine motor transmits by belting to an extended machine shaft with a sealing gland bearing in the partition wall

The air used by fume exhausters, drying equipments, etc., is produced in a centrally situated air-compressor station by Alley & MacLellan compressors, each of 2,500 cu. ft. capacity at 15 lb. per sq. in. and driven by a 200-HP, 425-RPM Laurence, Scott motor equipped with a Heyland phase advancer mounted on the motor. The advancer impresses a voltage on the induced voltage in the stator, which, in turn, superposes a voltage on the rotor, thus causing the current and the voltage to come into step. The motor is controlled by Allen West contactor and resistance equipment.

After flaking, the material is packed in linen bags to a carefully determined weight of contents and boxed. Frequent samples are taken and tested in large laboratories to ensure the high quality of the product.

Particular attention has to be paid to the ventilation of the finishing rooms, so as to ensure the rapid ejection of fumes and fine T.N.T. dust. The building is heated by hot air which is passed into the room by an externally housed motor-driven fan. There is also a fume ejection fan which must always be running before the heater fan is started up, and this is ensured by electrical interlocking between the heating and ejector fans. The two fans are balanced on the

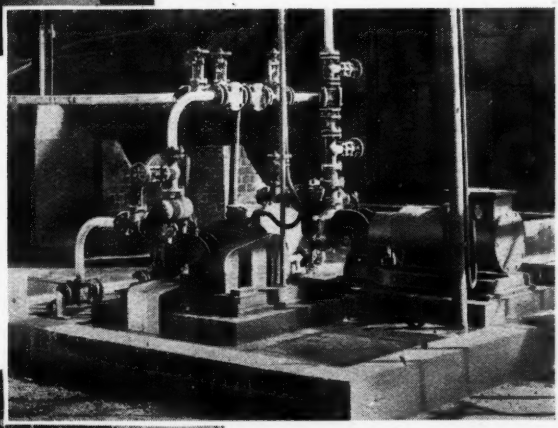


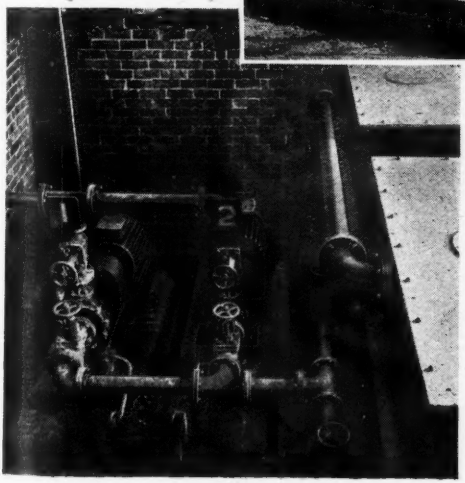
The heating-fan motor for the finishing building is electrically interlocked with the fume-ejector motor

plenum principle, and the main fan is driven by a 3-HP, 1,440-RPM L.D.C. squirrel-cage motor with a 3 to 1 ratio V-belt transmission direct to the fan shaft.

During the nitrating processes the acids used are reduced in strength, but they are recovered, first by de-nitrating the mixed acids and concentrating the sulphuric acid in producer-gas-fired stills. The weak nitric acid recovered from the de-nitrating process is available for re-use in the initial M.N.T. process. La-Bour pumps are used for transporting the weak sulphuric acid back to concentration plant, and they are driven by 7½-HP motors, one a flameproof slip-ring machine with rotor resistance starting and the other a weatherproof squirrel-cage unit with star-delta starting. The motors are directly coupled to the pumps.

The acids used in the processes are manufactured at the factory. Sulphuric acid is produced by the contact process of burning molten sulphur, passing the gas through a vanadium catalyst and then mixing the gas with water to form H_2SO_4. Nitric acid is produced by two methods. In the first a





Above : Pumping nitric acid to storage is the function of these two La-Bour pumps

Left : Recovered sulphuric acid is passed to concentration stills by two 7½-HP motor-driven pumps

mixture of ammonia gas, steam and oxygen is burned on a platinum catalyst. The nitrous gases from the platinum catalyst are cooled first by passing them through a waste-heat boiler which produces the steam for the gas mixture, and then through an absorption system using refrigerated brine for cooling. The raw acid so produced is finally treated in an autoclave with oxygen under a pressure of 50 atmospheres to produce HNO_3 of 98 per cent. strength. Each of the oxygen compressors is driven by a 85-HP, 975-RPM motor.

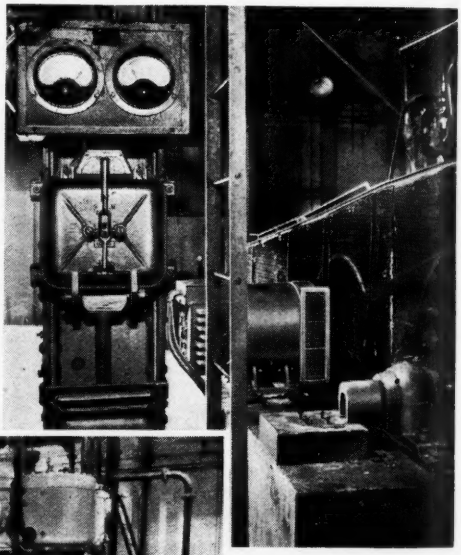
The nitric acid of 98 per cent. strength produced in this plant is passed on, after local storage, to the main storage tanks serving the T.N.T. plant by La-Bour pumps driven by 4-HP, 1,400-RPM squirrel-cage motors *via* 1½ to 1 belt transmission, with direct-on motor starting, and by a 7½-HP 1,440-RPM Laurence, Scott flameproof motor with star-delta starting.

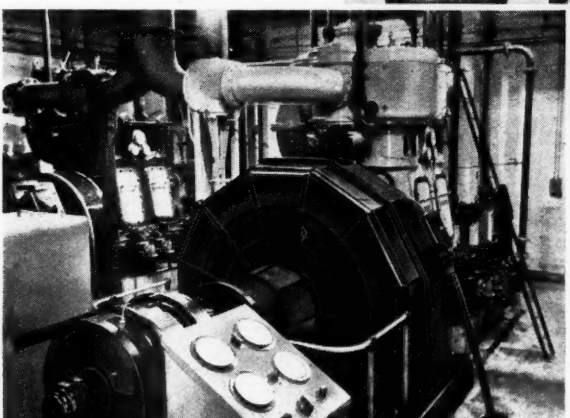
The oxygen required for the nitric-acid manufacture is produced from the atmosphere by fractional distillation of liquid air at 180 deg. C.

High-pressure, low-pressure, cooled and expanded air all go into the column in which, by the careful control of the boiling-off points of the liquid oxygen and nitrogen, oxygen of 99·5 per cent. purity is produced. The extreme cold necessary for this process is produced by compressing air to 3,500 lb. per sq. in. and then passing it through an expansion engine which uses about 50 per cent. of the h.p. air produced. The expansion engine drives by belt a G.E.C. compound-wound 20-kW, 500-RPM dynamo with a special arrangement by which the power of the engine is absorbed to control the amount of cooling and is varied by altering the load on the dynamo. This load is created by banks of immersion heaters in a boiler feed-water preheating tank. The immersion heaters are supplied from the dynamo *via* an ironclad fuse-board and three hand-operated switches by which the load is varied. The three banks of heaters consist of eight, eight and four tubes, respectively. The dynamo is controlled by a main switch and field regulator which, with the necessary ammeter and voltmeter, are mounted on a stanchion beside the expansion-engine driven dynamo.

The high-pressure air compressor is driven with a 3 to 1 V-belt transmission by a 175/132-HP, two-speed, 100/1,450-RPM slip-ring double-wound motor with contactor resistance rotor starting through a change-over switch. The low-pressure air compressor is driven by a 430-HP, 1,000-RPM synchronous induction motor provided with a self-contained exciter.

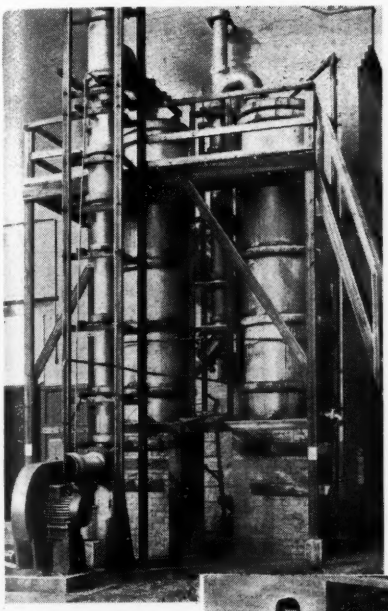
Another nitric-acid producing plant is of the pressure oxidation type. This plant uses air at 115 lb. per sq. in. produced by Belliss & Morcom compressors directly driven by 550-HP, 6,600-V auto-synchronous motors running at 250 RPM.

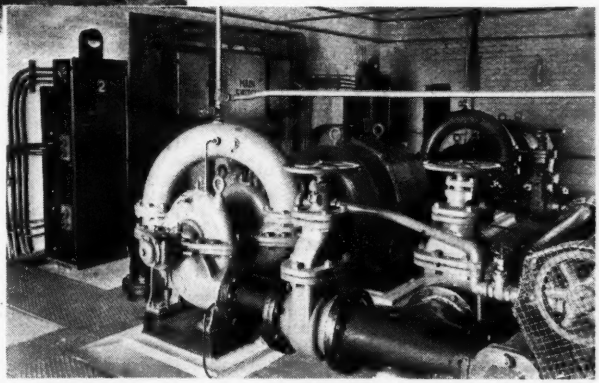




Above: The expansion engine of the oxygen-production plant drives a 20-kW dynamo for speed variation

Left: The pressure-oxidation nitric-acid producing plant uses air at 115 lb. per sq. in. produced by 550-HP 6,600-V auto-synchronous motor-driven compressors





Above : Fumes from the nitrators are drawn through absorption towers equipped with a simple directly-coupled fan

Right: Each of the main-motor-driven equipments at the river pump house will deliver 70,000 gallons per hr

In this plant ammonia and air are burnt over a platinum catalyst, and the nitrous gases are treated to produce a raw acid of 60 per cent. strength which is concentrated in towers with sulphuric acid in order to produce 98 per cent. nitric acid.

Process water for the whole factory is obtained from the nearby river at the rate of about 1,500,000 gal. per day. Fifty per cent. of this water is taken by those factory sections requiring untreated water, while the balance is passed through water-treatment plant for delivery where treated water is required. All the cooling water required for cooling jackets, compressors, etc., is checked for excess acid content by means of pH recorders and warning devices. Compressors are protected against water failure by monitor water alarms, while in some cases the protection takes the form of thermo-couples in the inter-cooler vessels where a considerable rise of temperature would occur should the circulating water fail. The river pump house is equipped with 70,000-gal. per hr. two-stage centrifugal Gwynnes pumps directly coupled to 145-HP. 1,460-RPM L.D.C. slip-ring motors with E.A.C. rotor-resistance contactor starting. Other electrical driven pumps at the river are for stand-by and fire services. The fire pump is remotely controlled by push-buttons from a central point half a mile from the pump house.

The British Council

IN promoting a better understanding abroad of the status and achievements of British engineering the Science Department of the British Council is performing an important service. One sphere of its activities is concerned with the practical and academic training of overseas students coming to this country, and scholarships, mostly post-graduate, are awarded by the Council. Valuable work has been done in the past by British engineers and scientists serving in overseas universities and technical colleges, and the Science Department helps in making recommendations of suitable candidates.

The dissemination of technical information involves, in addition to the circulation of periodical publications, the distribution of text-books and of films on technical subjects. Special articles illustrating recent progress in British engineering are prepared on a monthly basis and circulated overseas. Engineering booklets, forming part of the "Science in Britain" series sponsored by the British Council's Publications Department, are published in English, Spanish and Portuguese, and usually comprise short illustrated biographies of eminent British engineers; those of Sir Charles Parsons, James Watt and S. Z. de Ferranti have already appeared, while those of Col. R. E. Crompton and others are in preparation. The Council, in collaboration with the British Standards Institution, is considering proposals for the translation of a considerable number of specifications.

Electricity and Water

Pumping and Purification

THE application of electricity to water supply was the subject discussed at last month's informal meeting in London of the Institution of Electrical Engineers.

Mr. J. F. SHIPLEY, who at one time was concerned with water supply and purification abroad, introduced the subject. He said that more than 1,000 different authorities were supplying water in England and Wales; 25 of them furnished more than 50 per cent. of the needs of the country, 125 provided more than 25 per cent. of the requirements, and the remaining 875 satisfied one-quarter of the needs. A recent Government White Paper showed that electricity could play a great part in securing the provision of water.

Ordinary pumps would do for surface levels, but underground sources would need borehole pumps, reciprocators driven by motors, or submersible pumps. In Mr. Shipley's opinion the last-mentioned type was not yet fully developed; it suffered from extremely limited dimensions and very small clearances. The mechanical troubles now experienced were caused by the varying quality of the water and its effect on the materials used for constructing the pump. Mr. Shipley urged co-operation between pump makers and suppliers of electricity in respect of standardisation and the provision from stock of spare complete pumps. Purification with the aid of electricity included the ozone method and electrolytic processes (producing hypochlorite or injecting ionic silver), while ultra-violet light had been employed as a secondary purifier.

Reliability of Submersible Pumps

In the subsequent general discussion attention was directed to the automatic system of pumping, incorporating a pressure switch, whereby the need for overhead storage tanks of large capacity was dispensed with. Submersible pumps had been manufactured here for twelve years and had already achieved a high degree of reliability. Some details were given of their construction, and it was pointed out that pumps of this type had been submerged for as long as six years and had then required practically no overhauling and servicing. In one case the insulation resistance of the windings, after the pump had been submerged for 26,000 hours, was still 15 megohms.

The merits of electric drive for pumping plant were flexibility; decreased commitments as compared with other types involving prime movers (incidentally, after the war, it would be easier to obtain electric motors and centrifugal pumps than prime movers); automatic control; amenities at the pumping stations (no smoke and little noise); and ability to provide light and heat at the stations as well as the motive power. One of the de-merits was said to be the risk of breakdown of the electricity supply, which was not under the control of the water authority, and it was stated by a representative of an urban supply that, where electrical plant was depended upon for the main duty, a standby plant capable of the necessary output, with a further standby to the standby, was always installed. But the standby could be used effectively for " peak-lopping."

Co-operation Between Authorities

It was held that, inasmuch as the peak load for water was in the summer and the electrical peak load occurred in the winter, water and electricity authorities could afford each other mutual aid. Another point was that local supplies of underground water, which could not always be utilised economically when steam plant was used, could easily be made economically available by electric pumping, provided the tariffs were suitable. There was a plea also for standardisation of conditions. It was said that there were 50 electricity authorities supplying in the area of the Metropolitan Water Board, giving ample opportunity for co-operation in order to make the best use of the diversity factor. The warning was given that the C.E.B. tariffs were subject to review a year hence, so that any long term commitment must bear that point in mind.

A suggestion to apply the variable pitch propeller principle to the centrifugal pump to give a 15 per cent. variation of output at fixed speed in order to vary the head of water when required, was put to Mr. Shipley who pointed out that it would be suitable only for small heads.

Another speaker, representing a supply company, contributed detailed data concerning rural water supplies and said that during the war with numerous " incidents " averaging six per day which actually interfered with electricity supply, the high continuity of 98·7 per cent. was experienced. As regards tariffs, electric pumping enabled great savings to be effected in capital costs. Particulars were given of costs of pumping with Diesel and electric plant respectively in connection with a drainage scheme, the sets being of 50 HP and running 500 hours per annum. The total capital costs were £970 for electrical plant and £1,540 for Diesel; and the operating costs per annum were £201 and £233 respectively, the Diesel plant having to bear the greater capital costs.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Electricity Commissioners announce the retirement on January 15th of **Mr. R. T. G. French**, C.B.E., who has been secretary to the Commissioners since their appointment in 1920. He has been succeeded by **Mr. A. E. Marson**, M.B.E., assistant secretary, and **Mr. C. J. Hornsby** has been appointed assistant secretary.

Lt.-Col. E. M. Lloyd, commanding the 12th Advanced Base Workshop, R.E.M.E., Central Mediterranean Forces, has been awarded the O.B.E. (Military Division) for gallantry and outstanding services in North Africa and Italy. Lt.-Col. Lloyd was on the London Office staff of the Metropolitan-Vickers Electrical Co.

Mr. Leslie Gamage, vice-chairman of the General Electric Co., Ltd., has been elected president of the Institute of Export for the third successive year, and also Master of the Worshipful Company of Glaziers for 1945.

We are sorry to learn that **Mr. Hedley Large**, borough electrical engineer of Stoke Newington, was injured recently. He was much shaken, but we are pleased to hear that he is making satisfactory progress.

Mr. R. W. Bishop, until recently technical assistant to the Cable Planning Organisation, Ministry of Supply, has joined Duratube & Wire Ltd., as manager of the Technical Service Department. Mr. Bishop received his initial training with the Colne Valley Electric Supply Co. and had further experience with British Insulated Cables, Ltd., and the North Metropolitan Power Company. Subsequently he held positions with Sherriff & Co., Ltd., Leicester, the Palestine Public Works Department, and the Bective Electric Co.

Mr. R. W. Bishop

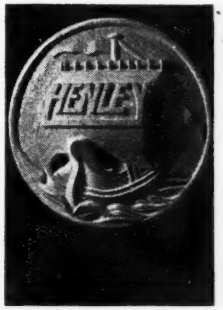
Coventry Electricity Department is advertising in this issue for a power station superintendent at Longford. The salary is in accordance with Class J, Grade 3, of the N.J.B. Agreement, and a house is available, rent free. Harrogate Electricity Department requires a consumers' engineer, the position carrying a salary in accordance with Grade 4, Class F.

A children's party was held in the works canteen of Southern United Telephone Cables, Ltd., on January 20th, under the auspices of the Dagenham Cables Sports Club. Approximately 200 children of employees were entertained to tea, after which there was an excellent concert. Mr. Meadows, chief of the test department, made his usual dramatic entrance as "Father Christmas" and the prizes were distributed by Mr. F. W. Johns, director of the Union Cable Co., Ltd., Mr. A. F. Lampitt, business manager and secretary of Southern United Telephone Cables, Ltd., and Mr. Meadows.

Mr. F. W. Purse is to continue as chief engineer to the London and Home Counties J.E.A. for a further period of twelve months from February 5th.

Subsequent to the retirement of **Mr. Clark H. Minor** as chairman of the International General Electric Company of New York, Ltd., **Mr. V. J. Radbone** has been appointed chairman. **Mr. J. F. Stewart**, who was joint managing director with Mr. Radbone, is now sole managing director, and **Mr. A. T. Neale** has been appointed secretary.

Sir Montague Hughman, chairman of W. T. Henley's Telegraph Works Co., Ltd., was presented with an unusual gift at a recent luncheon attended by the directors and departmental chiefs of the company. The secretary, Mr. A. H. M. Jacob, presented him with two carved oak plaques, reproducing Henley's "Argosy" trade mark, made from wood recovered in the clearing of wreckage resulting from enemy action. One piece came from the former head office in Holborn Viaduct and the other from the rubber cable works. Sir Montague expressed his admiration of the craftsmanship of the wood carver and said that one of the plaques would repose in the board room of the company as a reminder of these difficult and dangerous times, and he was proud to accept the other as a personal memento.



One of the carved oak plaques presented to Sir Montague Hughman

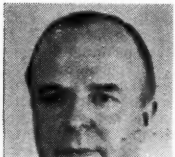
Mr. E. B. Preston has been appointed manager of the London office of C. A. Parsons & Co., Ltd., in place of **Mr. A. M. Ranft**, who has resigned on the grounds of ill-health.

Mr. J. E. M. Herbert has recently joined the board of North London Toolmakers, Ltd., and has been appointed managing director. He was purchasing agent for Standard Telephones & Cables, Ltd., with whom he served for many years in various capacities.

Mr. H. Midgley, city electrical engineer of Plymouth, points out an error which appeared in our last week's account of air-raid damage to his undertaking. After the heavy evening raid of January 13th, 1941, the supply to vital services was restored by 10 p.m. on the *same* day—not the following day as stated. We regret that we failed to give full credit for this remarkable piece of work.

The Electrical Trades Commercial Travellers' Association is holding its sixth annual lunch on Friday, February 16th, at the Connaught Rooms, London, W.C.2.

As reported briefly last week, **Mr. W. W. Vinsen,** manager of the Coventry works of the British Thomson-Houston Co., Ltd., and **Mr. E. S. Little,** comptroller and head of the accounting department, have been elected directors of the company. Mr. Vinsen has been appointed assistant director of manufacture, and



Mr. W. W. Vinsen

Mr. E. S. Little

will assist Mr. G. M. Campbell, director of manufacture. He was educated at Cambridge and served an apprenticeship with W. G. Pye & Co., Ltd., and with the Cambridge Scientific Instrument Co., Ltd. After other experience, he joined the B.T.H. Company in 1923, being appointed general superintendent of the Coventry works in 1926, acting manager in 1928, and manager in 1934. During the last war, Mr. Vinsen was in the Army from 1915 till 1919, seeing service in Macedonia, France and Belgium. Mr. Little received his early education and training in Bath and Bristol. He joined the company's accounting staff in 1912, later becoming assistant to the comptroller. In 1929 he was placed in charge of the general accounting department, and in 1936 was appointed comptroller and chief accountant. During the last war Mr. Little saw service with the Royal Artillery in France.

Obituary

Professor J. K. Catterson-Smith.—We report with great regret the death, on January 25th, of Professor John Keats Catterson-Smith, M.Eng., M.I.E.E., University Professor of Electrical Engineering, King's College, London. Professor Catterson-Smith, who was sixty-two, was educated at the City of London School, the South-Western Polytechnic and Birmingham University and was Bowen Research Scholar at Birmingham. For three years he was with the Siemens Dynamo Works and in 1907 commenced his scholastic career, eventually being lecturer in electrical engineering at Liverpool University from 1909 to 12. During the subsequent three years he was chief assistant to Silvanus P. Thompson at Finsbury Technical College and, later, acted in the same capacity to Dr. W. H. Eccles.

He held a commission in the R.N.V.R. during the last war and became experimental wireless officer in the *Vernon* and at the signal school. After a period as lecturer in electrical machinery at Faraday House he went, in 1923, to India to become Professor of Electric Technology in the Indian Institute of Science at Bangalore of which he was elected an honorary fellow. While in India he founded *Electrotechnics* and was its editor until his return to England in 1930.

Professor Catterson-Smith leaves a widow, a son and a daughter.

Lt.-Col. D. L. Selby-Bigge.—The death recently occurred in a London nursing home, at the age of 80, of Lt.-Col. Denys L. Selby-Bigge, T.D., who assisted the late Sir Charles Parsons in the earliest stages of his invention and development of the steam turbine.

Mr. William Martin Haddow, M.I.E.E., J.P., who has died in a Glasgow nursing home at the age of seventy-nine, was a pioneer of telephony and a founder of one of the earliest electrical firms in Glasgow.

Sir Basil Peto, Bt., who died on Sunday last at the age of eighty-two, was associated with the Morgan Crucible Co., Ltd., for about twelve years, until 1904. He was managing director of the company and travelled extensively in its business. He was Conservative M.P. for Devizes and later for Barnstaple, but retired from politics in 1935.

Mr. J. A. Hirst.—Last week we briefly reported the death of Mr. John A. Hirst, founder and, until his recent retirement, chairman of Brookhirst Switchgear, Ltd., and a vice-president of B.E.A.M.A., of which he was a past-chairman. Brookhirst Switchgear, Ltd., commenced business on a modest scale as Brook Hirst & Co., mainly as switchboard makers and installation contractors, but Mr. Hirst foresaw the immense potential development of electric power drive and he translated his views into action. With his inventive genius and leadership, the business changed character, rapidly developed and the company, as Brookhirst Switchgear, Ltd., became one of the leading manufacturers of motor control gear and switchgear, attaining a world-wide reputation.

The late Mr. J. A. Hirst

Notwithstanding his electrical and industrial activities, Mr. Hirst in his later years became an authority on the breeding of thoroughbreds. His stud at Sezincote, in the Cotswolds, has produced many first-class horses, including the Ascot Gold Cup winner, Tiberius, and the Chester Vase winner, Valerius.

One of his colleagues says:—"John A. Hirst was much more than a successful man of business. He maintained a standard of commercial ethics which was natural to him and which permeated those who worked with him. For himself, he had no other standard than the best. Strict in his own standards, he was tolerant of human nature, while determined that what was done in his name should be honest and thorough. He was particularly careful to keep faith with the man who was doing an honest business on a small scale. He deplored "cut-throat" competition as a practice unfair to those engaged in industry and especially when highly technical manufactures were involved."

The interment took place at Bourton-on-the-Water, after a memorial service at St. Lawrence's Church.

Forthcoming Events

Saturday, February 3rd.—*Manchester.*—Engineers' Club, 6.30 p.m. I.E.E. North-Western Students' Section. Students' Lecture: "The Cathode-ray Tube and its Applications," by Dr. W. Wilson.

Manchester.—16, St. Mary's Parsonage, 2.30 p.m. Junior Institution of Engineers (N.W. Section). Annual general meeting and chairman's address on "Factory Management," by F. Burgess.

Monday, February 5th.—*Liverpool.*—Royal Institution, Colquitt Street, 5.30 p.m. I.E.E. Mersey and North Wales Centre. "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol.

Tuesday, February 6th.—*London.*—Brook Green Hotel, Hammersmith, 7.30 p.m. Association of Supervising Electrical Engineers (N.W. London Branch). "Drying by Infra-red Radiation," by W. E. J. Drake, A.M.I.E.E.

Birmingham.—James Watt Institute, 6 p.m. Electrodepositors' Technical Society. "Influence of Anodes on Plating Processes," by S. R. Goodwin and H. A. Bechtold.

Coventry.—Coventry Electric Club. "Radio-frequency Heating," by E. T. Norris, M.I.E.E.

Wednesday, February 7th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Radio Section. "Aerials for Use on Aircraft: A Comparison between Fixed and Trailing Types on the 900-Metre Waveband," by Flt.-Lt. C. B. Bovill.

Thursday, February 8th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Installations Section. "Development of Motor Control Gear," by D. Rudd.

Saturday, February 10th.—*London.*—Lighting Service Bureau, 2, Savoy Hill, 2.15 p.m. Illustrated lecture on "Distribution of Electricity in London," by E. H. Jesty.

Manchester.—College of Technology, 6–10 p.m. I.E.E. North-Western Students' Section and students of the College. Dance.

Monday, February 12th.—*Newcastle-on-Tyne.*—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Survey of the Problems of Post-war Television," by H. J. Edwards.

Bristol.—Merchant Venturers' Technical College, 5 p.m. I.E.E. Western Centre. "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol.

Tuesday, February 13th.—*London.*—Institution of Electrical Engineers, 7 p.m. London Students' Section. Students' Lecture on "The Cathode-Ray Tube and its Applications," by Dr. W. Wilson.

Manchester.—Engineers' Club, 6 p.m. I.E.E. North-Western Centre. "Thermoplastic Cables," by Dr. H. Barron, J. N. Dean and T. R. Scott, D.F.C.

London.—At Institution of Mechanical Engineers, 6 p.m. Illuminating Engineering Society. Discussion on the report of the D.S.I.R. Committee on the "Lighting of Buildings," to be introduced by Dr. C. C. Paterson, O.B.E., F.R.S. The chairmen of the sub-committees dealing with natural and artificial lighting will reply to technical points raised.

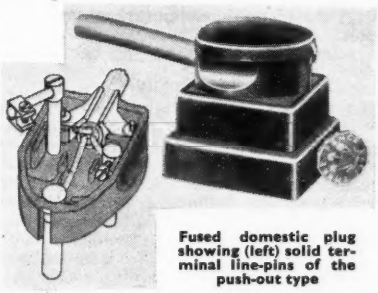
Wednesday, February 14th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Transmission Section. "Operation, Maintenance and Testing of Overhead Lines and Associated Outdoor Equipment on AC Systems," by R. C. Hatton and Dr. J. McCombe.

Birmingham.—James Watt Institute, 7 p.m. Junior Institution of Engineers (Midland Section). Address by Major-Gen. K. C. Appleyard, president of the Institution, after which the T.V.A. film will be shown.

Fused Domestic Plug

AMONG a range of accessories being produced by VICTOR H. IDDON, LTD., Harper Road, Wythenshawe, Manchester, under the trade name "Nettle" is a fused plug for household socket outlets which is very compact. Although the plug body is of the usual 5-A size made to B.S.S. it incorporates a B.S. fuse type "A." One cap of the fuse is gripped by the head of the live pin, while the other cap is held tight by the terminal for the live conductor and, furthermore, a spare which is housed in the recessed space of the plug lid is protected by an insulating cover marked "Spare Fuse."

The fuse cartridge is replaced by a current-carrying pin in the case of the unfused plug and markings on the body indicate the type. A feature of convenience is that the earth and



Fused domestic plug showing (left) solid terminal line-pins of the push-out type

line pins are solid with their terminals, and can be pushed out of the plug body for quick wiring.

An improvement is the automatic cord grip, for which a patent application has been made. The design consists of two serrated levers, pivoted in the body. Both levers press the conductor firmly against serrations in the base. Any size of flex or cable normally used is gripped over a sufficient area to ensure that unavoidable movement of the conductor does not result in cutting the insulation. The levers are tapered, so that the grip is of a wedging character when the cable is pulled.

The lid of the plug is fastened to the base by the two screws which operate simultaneously the two cordgrip levers. The reduced number of screws employed in the plug can speed up wiring considerably when used to its full advantage on mass-assembly.

Ratings at present being manufactured are 5 and 15 A. Prototypes of other sizes, and of various pin centres, have been made to cater for whatever compromise may ultimately result.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Earth Electrodes

THE article entitled "Electrical Safeguards" which appeared in your issue of January 5th, shows an excellent illustration of a "pancake" type of earth electrode as used at an explosives factory. Lest your readers should make the erroneous assumption that this method of earthing is still widely used, I should like to mention that I was consulted about the earthing of a large number of ordnance factories erected since the war, and in all of these the earthing consists of ½ in. diameter driven copper rods and buried copper tape—the latter being in straight lines and generally connected to driven rods.

The disadvantages of the "pancake" coil as described are: High earth resistance for a given amount of material; cost of excavation; unnecessarily large cross section of copper, namely, 1 in. by ⅛ in. and risk of corrosion of the electrode by the coke breeze.

Finally I might mention that to bury such an electrode 2 ft. below the permanent water level would be quite impracticable at many sites.

Hatch End, Middlesex. H. G. TAYLOR.

Silent Switches

I UNDERSTAND that there is at present an expert committee of electrical engineers sitting and that they are likely to consider, amongst other points, the design of electric switches for domestic use. May I, through you, urge the committee to give careful consideration to the possibility of producing a reasonably priced silent switch? I am aware that such switches have been made for some years but they cost considerably more than the normal types. Any family man will confirm that the average noisy switch can easily wake a child and a silent switch is most desirable in bedrooms. If the switches could also be made phosphorescent, groping for them in the dark would also be eliminated.

London, W.1. ANTHONY MINOPRIO, F.R.I.B.A.

District Heating

THE mathematics of Mr. Pryce Jones is very interesting but also effective in fogging the issue, which is solely whether it is more economical to generate electricity in high-efficiency condensing turbines or to generate the electricity less efficiently in pass-out turbines and sell part of the latent heat which would otherwise be lost. It is freely admitted that there are many situations where efficient combination of heat and electricity would be difficult if not impossible, but such successful combination is evident in many factories and paper mills over the country and the principles, accepted there, stand for the larger development.

I seriously suggest that an open-minded study be made of such schemes as that at Brno, Czechoslovakia, and that effort be put into getting over the difficulties instead of magnifying them. In the plant referred to the saleable energy was 72·8 per cent. of that put into the plant as coal. In the face of figures of this sort there can be no case advanced on a thermal basis for the condensing turbine producing electricity to supply the same energy demand. It is, of course, of great importance that the generation of steam and its utilisation before pass-out shall be as efficient as modern practice can make it.

If more than lip service is to be paid to the essential need to conserve one of our few serious national assets, we must see to it that the planning of our cities allows such a combination to be considered and limits the sale of high-grade energy where low-grade by-product energy can be used.

Clearwell, Glos. B. S. GYLEE.

The Post-war Cooker

MR. R. ILLINGWORTH'S letter in your issue dated January 19th is very interesting. I also should like to know how the decision was come to for a grill boiler and only one hotplate.

I do not consider one hotplate good propaganda on the part of the Electrical Development Association, and from my practical experience of hiring many thousands of cookers during the past twenty years I think that post-war cookers should at least have two hotplates and one grill boiler.

Ilford. G. I. GREGORY, *Borough Electrical Engineer and Manager.*

Circular Cookers

THE circular cooker illustrated in your issue of January 5th, is described as a complete break-away from conventional design. It is not, however, by any means a new idea. Many of your readers will probably remember the "Prentice" cooker of thirty years ago or more, which was on very similar lines.

Gateshead. P. WARD.

Electric Shock in Bath.—A thirteen-year-old Middlesbrough girl, Dorothy G. Bennison, received a fatal electric shock last week while having a bath. At the inquest it was stated that an electric fire which had been standing nearby was found lying across her chest.

X-rays in Industry

Many Possible Future Uses

A SURVEY of the several ways in which X-rays are utilised in engineering and industry has been presented by MR. V. E. PULLIN, C.B.E. (Ministry of Aircraft Production) to the Institution of Electrical Engineers.

The first section of the paper records in broad outline developments up to the beginning of the present war, in respect of both uses and equipment. The middle portion is concerned with radiographic inspection, with particular regard for Service requirements. The magnitude of the system devised may be gauged from the fact that there are some 50 X-ray laboratories in Great Britain working under the ægis of the Aeronautical Inspection Department alone, which is perhaps the oldest user of X-rays as a routine method of inspection. Not only has the system proved to be successful for inspection, but it has also produced a large number of efficient engineering radiographers. Correct technique is of vital importance ; and the author expresses the hope that some of the universities will develop this subject in a specialised faculty by instituting suitable courses, terminating in the issue of a recognised diploma of efficiency.

Penetrating Eight-inch Steel

Early in the present war the General Electric Co. of America (Victor X-ray Corporation) placed on the market equipment which produces a maximum of 3mA continuously at 1,000,000 V and is capable of radiographing steel from 1 to 8 inches thick with economical exposures. Two of these equipments are in Britain ; one is already operating in the Armament Research Department, while the other is being installed in the Aeronautical Inspection Department's test house. A special laboratory has been erected for the reception of the apparatus and, for the protection of personnel, distance has been the governing consideration in its design ; in addition the operators are protected by 18-inch walls of poured concrete. The specimen to be radiographed is placed in a concrete pit having 18-inch concrete walls, the equipment itself being mounted on a pantograph crane running on overhead rails.

So far as future uses of X-rays are concerned the author believes the most likely development will be in a consultative capacity, so postulating the setting-up of non-destructive testing laboratories and the provision of mobile outfits for use on the sites of special jobs. One of the most important functions of radiography will be in development engineering ; the author hopes that every foundry in the country will be adequately equipped and procedure systematised. X-ray examination will be increasingly utilised for the critical investigation of welding methods, but routine inspection in this sphere will in many instances be impracticable. X-rays will also be used in engineering assembly shops, particularly those engaged on complicated electrical components. Current ideas about inspection by X-rays are expected to change, for its real value will appear in research and development rather than in routine examination.

Scope for Improvement

The absurdly inefficient processes involved in producing a radiograph are a good pointer to post-war photographic improvement. Only about one per cent. of the energy entering a tube emerges as X-radiation and not more than the same percentage of that radiation is of actual value in producing a photographic image. More actinic rays are therefore urgently needed as well as fast photographic film which must be gainless and produce sharp contrast.

The chief users of X-rays will continue to be in the light alloys industry, for which equipment operating at from 100 to 200 or 300 kV will be necessary. Improvements will be better mobility, small size and greater beam intensity. High-power tubes for industrial service have hitherto been made abroad. The resonance principle is likely to be extended generally to X-ray transformers and gas will supersede oil as the insulating medium, thus improving lightness and transportability.

It is the author's opinion that radium-rays will never supersede X-rays for industrial radiography; the advantages of the former will be nullified as X-ray voltages increase, in which connection some very important work is at present in progress in the United States under Government auspices.

X-ray equipment has already been made to operate at upwards of two million volts; among its remarkable features is an extraordinarily small focal spot, which is stated to be of the order of 0·01 inch, postulating a radical departure from the conventional design of X-ray tubes. The output of X-rays is so great as to penetrate some 14 inches of steel with an economical exposure time. Further work is in progress at the University of Illinois on the development of equipment to operate at from four to twenty million volts, based on the principle of the acceleration of electrons (betatrons) in a magnetic field.

Long-Distance Radio

Allocation of Frequencies

FREQUENCY allocation for radio communication over great distances was the subject debated at the January discussion meeting of the Radio Section of the Institution of Electrical Engineers in London.

DR. R. L. SMITH-ROSE (N.P.L.) confined his introductory remarks to the 10 to 300 kc/s and 3 to 30 Mc/s bands, because they were considered most suitable for service at a usefully high load factor. Justification for the selection of those bands was based on better knowledge of wave propagation acquired since the prevailing distribution of channel frequencies was drawn up by the International Radiocommunication Conference in 1938 at Cairo.

The intermediate band of 300 to 3,000 kc/s was uneconomic for ranges exceeding 1,000 miles, since attenuation of the ground wave and absorption of ionospheric waves precluded reliable communication over such distances. Experience with the P.O. transmitter at Rugby justified continuance of the use of the lower end of the 10 to 300 kc/s band (up to 100 kc/s) for fixed stations with ranges exceeding 1,000 miles, while the upper end (to about 300 kc/s) could usefully be confined to services operating entirely overseas so as to obtain maximum utilisation of the reliable ground-wave range. At least one radio-telephone service had been operated successfully on a carrier frequency near 60 kc/s; it was perhaps relevant to inquire whether the frequency band required for such service could not be more usefully and economically employed for telegraphy.

Division of 3 to 30 Mc/s Band

It was not so simple to suggest allocations of frequency in the 3 to 30 Mc/s band. The wave-lengths involved (10 to 100 metres) were suitable for highly directional antenna arrays and it seemed logical to divide each available band into two portions; the upper frequencies should be allocated to omni-directional circuits (or partially so) of low power for fixed-to-mobile or mobile-to-mobile stations, and the lower frequencies to point-to-point circuits with fixed stations of ample power to take full advantage of beam transmission.

Only in very exceptional circumstances (in wartime for instance) should short-distance circuits utilise a frequency within the bands specified for long-distance operation.

In the discussion there was general agreement with the broad principles laid down by the opener, though it was contended that the lower frequencies (10-60 kc/s) should nowadays be regarded mainly as a stand-by to the 3 to 30 Mc/s bands, to be used principally for maintaining a service when ionospheric conditions made it necessary. On account of atmospherics the average traffic capacity of 10 to 60 kc/s channels was low.

On the question of order of priority for the various services, it was agreed that those concerned with safety of life and with communication to or between mobile stations, particularly ships and aircraft, should rank higher than those between fixed stations. Transoceanic telephony should also rank high. Some support was given to recent American proposals that long-distance international broadcasting should be relayed over fixed point-to-point links for distribution through national broadcasting systems. This would effect an economy in band width, as single sideband methods could be used.

Closer Frequency Tolerances

It was widely believed that political and similar considerations would stand in the way of a rational allocation of frequencies on a purely scientific basis, and so making the best possible engineering use of channels was of great importance. The dual-purpose use of telephone channels for multi-channel voice-frequency telegraphy was suggested and it was thought that telegraph channels might be narrowed ; a 250-words-a-minute circuit should need a band-width of oniy 400 c/s. Frequency tolerances should be closer and more strictly observed and, in general, there should be drastic reduction of band-widths. It was suggested that mutual interference could often be avoided by defining the type of directional aerial to be used with a given frequency allocation. By taking proper advantage of the fact that one-half of the globe was in darkness while the other was illuminated, many allocations could be duplicated.

The tendency to aim at providing direct radio communication services between all the important centres of the world was thought to be inefficient or impracticable; wider use should be made of the principle of relaying over paths enjoying more favourable propagation conditions. Proposals already published for an international relay network were open to criticism, as the suggested relay stations would be situated in zones where the prevailing noise levels were high.

In summing up the discussion the opener agreed that until priority between the various services was settled it would be impossible to make final decisions. Ultimately, it might be necessary to accept the principle that radio should be restricted to those communication services for which a metallic connection was impracticable.

Crane Hoist Motors

Series and Compound Wound Types

By R. S. Bennett, A.M.I.E.E., A.M.I.Mech.E.

THE majority of hoist motors fitted to DC cranes are of the series wound type with the armature coils banded to withstand two and a half to three times normal speed. Most of them are too large for even heavy overload conditions and failures of their armatures are usually caused by burst bands due to over-speed, in spite of series brakes being installed.

The use of a series motor which is too large for the duty means that on light load it can run at exceptionally high speeds, whereas with a motor of the correct size (which in some cases may be half the horse-power of the machine actually installed) light load represents approximately one-fifth of full load which limits the speed of the series motor to a definite value.

Speed Control

Several schemes have been devised for controlling the speed of crane hoists while lowering, such as dynamic braking, but all call for added electrical apparatus. The two most desirable features are that hoist motors should be compound wound and of smaller HP rating. Of these two features the first is by far the most important.

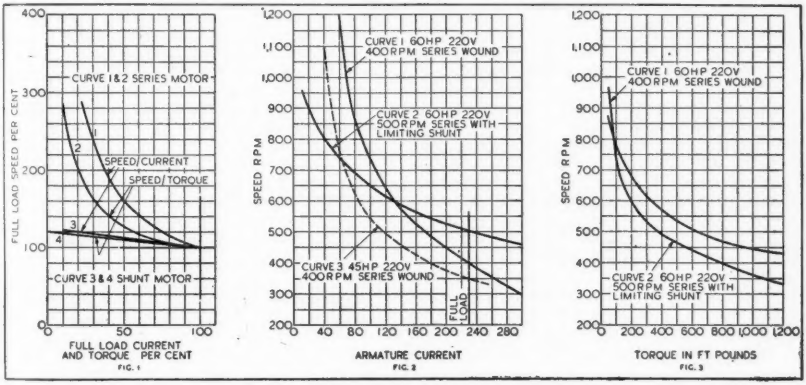
Motors wound for series operation with a limiting shunt, or compound wound, will have characteristics between the two typical sets of curves shown in Fig. 1. Having selected the correct size of motor and speeds for a hoist duty, it then remains to proportion the series and shunt windings to produce the desired starting torque and to limit the speed to a value which does not exceed the speed for which the armature is banded.

The two motors represented by Figs. 2 and 3 are rated at 60 HP each, but have different full load speeds. These curves make quite clear the point that it is possible to obtain excessively high speeds with the series type motor for small armature currents when the motors are too large for the duty, whereas with the series and limiting shunt type motor the speed is tied down even with small armature current.

Nameplate and Full Load Ratings

Test results of a number of crane hoist motors show that in no case is the nameplate HP rating attained under full load condition. In many cases the full load HP corresponding to the full load rating in tons of the load to be lifted is of the order of 75 per cent. of the nameplate rating. The dotted curve (Fig. 2) for a 45-HP, 220-V, 400-RPM, series-wound motor shows that with the correct size of series-wound motor the speed can be tied down to much lower values of armature current than is the case for the motor installed, *i.e.*, a 60-HP, 220-V, 400-RPM machine.

The conclusion is that the installation of compound-wound instead of series-wound motors for crane hoisting duty would save a great deal of time due to troubles experienced with the series type motor. While the control gear for compound-wound motors would be slightly different from that of the series-wound machine, when considered as a whole it could be much simpler than it is at present.


FULL LOAD SPEED PER CENT
CURVE 1&2 SERIES MOTOR
SPEED/CURRENT
SPEED/TORQUE
CURVE 3&4 SHUNT MOTOR
FULL LOAD CURRENT AND TORQUE PER CENT
FIG. 1
SPEED R.P.M.
CURVE 1 60HP 220V 400RPM SERIES WOUND
CURVE 2 60HP 220V 500RPM SERIES WITH LIMITING SHUNT
CURVE 3 45HP 220V 400RPM SERIES WOUND
FULL LOAD
ARMATURE CURRENT
FIG. 2
SPEED R.P.M.
CURVE 1 60HP 220V 400RPM SERIES WOUND
CURVE 2 60HP 220V 500RPM SERIES WITH LIMITING SHUNT
TORQUE IN FT POUNDS
FIG. 3

Characteristic curves of crane hoist motors

Views on the News

Reflections on Current Topics

FURTHER evidence of the inadequacy of the electrical share (one electric to two gas) of the contracts for the equipment of the first allocation of Ministry of Works temporary houses comes from recent decisions of local authorities. Eastbourne, Oswestry, Bath, Grimsby, Lanark, Accrington and Walthamstow have definitely decided to have all the bungalows completely electrified, while Leicester and Swindon are among several places which are still considering recommendations for all-electric installations.

* * *

I thought that Mr. Harold Hobson's broadcast talk last week on the reasons for and imperative necessity of economy in the use of electricity in the morning was very straight from the shoulder. Wartime conditions justify such direct admonition and one only needs to give a thought to the plight of most people in Europe to realise how comparatively fortunate we are. Nobody should blame the Central Board, for it is as much the victim of circumstances as the consumer deprived of warmth and maybe his breakfast. It has saved the industrial situation at really small sacrifice of domestic comfort.

* * *

People with electric clocks have recently complained of their erratic behaviour. The explanation is that at times of exceptionally heavy demands on the grid the frequency is pulled down and clocks consequently run slower. Efforts have been made to counteract this by running a little over normal frequency before the excessive load comes on and so the discrepancy has not really been serious and it has been in the right direction, *i.e.*, the clocks have been a little " fast." They have been right for the nine o'clock news and are still far more reliable than the average domestic spring-operated clock.

* * *

At a general meeting of the National Farmers' Union last week a resolution was adopted calling upon the Government to direct electricity undertakings to supply lighting and power facilities to rural areas, particularly to farms and workers' cottages, at standard rates and uniform voltages. For years the *Electrical Review* has been a strong advocate of rural electrification and has encouraged every step taken to realise this, and so I should not be misunderstood if I describe the resolution as a tall order. In the first place, tariff and voltage unification are already the subjects of serious study from the national, not the purely rural, point of view. Secondly, no mention is made of any assistance or compensation to the electricity supply authorities for the expense they would incur. In the third place, " facilities " is the word used and this seems to imply not only the supply of electricity but installations and apparatus too.

* * *

However anxious farmers are to obtain the benefits of electricity they must be reasonable. Undertakings generally are prepared to meet farmers' desires, provided that it does not involve them in a dead loss. Where they are unwilling it is most probably because there is little prospect of any return. It should be placed on record that at the meeting the chairman of the Union's Commercial Committee referred to recent talks with the power companies from which it was hoped plans would develop which would satisfy the Union. More is likely to be achieved in this way than by proposals for Government " direction."

* * *

In the exceptionally cold weather recently experienced, it is only natural that the claims made for district heating should have received a stimulus. The timely reminder to the general public which Brig.-General Wade H. Hayes, managing director of Edmundsons Electricity Corporation, has given in the *Evening Standard* regarding some of the snags inherent in schemes of this kind should, I think, help in creating a truer perspective. The piping of hot-water throughout a town could, of course, be done at a cost in some cases, though not in all. In existing cities there would be little room in an already congested sub-soil for further pipes of large diameter radiating heat.

* * *

Discussions on district heating have become complicated by the allocation of the same term to different methods, *viz.* the use of lukewarm cooling water from condensers, of steam exhausted from back-pressure turbines or extracted from pass-out turbines both in connection with electricity generation, and of steam raised in independent boilers, possibly housed for convenience in the same building as the turbo-alternators. It seems to me that such experience as is available from abroad is very little guide to practice here, but the awaited report of the Department of Scientific and Industrial Research may support Sir Charles Reilly's view that district heating could be applied in certain bombed out areas or in new towns, though probably only to a limited degree. There seems little likelihood of its successful extension, as he apparently envisages, to twenty-five of the largest towns in this country.—**REFLECTOR.**

Experimental Results

Applying Simple Tests

THE fixing of confidence limits to measurements is discussed by MR. H. J. JOSEPHS (Post Office Research Station) in a paper read before the Measurements Section of the Institution of Electrical Engineers. The author's object is to illustrate by means of a few examples the kind of information that can be obtained by applying simple tests of significance to experimental results. The method is employed in the research laboratories of the Post Office at Dollis Hill in telecommunication engineering; for example, in the analysis of speech levels of calls from European subscribers, *via* inter-Continental trunk circuits, measured at the London radio-telephone input terminal.

The author hopes it will become clear that the tests he describes can readily be applied to the determination of the probabilities associated with any class of electrical measurement. In the majority of cases the need is to determine whether observed data are in agreement with a proposed theory. But casual inspection of the data will not indicate whether observed variations are those to be expected to result from pure chance, or denote a real discrepancy between observation and hypothesis.

Tests of significance are a means of detecting the latter. The results are given as a probability, with reference to a number between zero and unity. For example, if greater than five per cent. it is said to be not significant because it may be ascribed to pure chance. If between one and five per cent. the deviation probability is said to be significant, making it necessary to obtain more measured data or collect further information before a definite statement can be made. If the level is below one per cent. the significance is said to be high, remembering that the term is relative and the levels purely arbitrary.

The tests are elementary and involve only a small amount of simple arithmetic. Consequently they enable an engineer to replace guesses or tentative estimates by well-founded probabilities and so to assess the reliability of some of his results.

Discussion

Opening the discussion, SIR CHARLES DARWIN (N.P.L.) said that the industrial use of the methods described was begun in the laboratories of the General Electric Co. in England and those of the Bell Telephone Co. in New York. Everybody ought to have a feeling for this subject, although he did not suggest that everybody should strive to master the technique. For instance, in the design of a new form of electric motor there should be one particular man in the team who should be expert in how to distribute the windings and how to place the copper on the armature. Although the rest of the team need not be experts like that, every single one of them should have a feeling for this subject. It was hoped, at Teddington, in the not too distant future, to embark on a much deeper interest in statistics than in the past. The methods described should make it possible to obtain a fairly good knowledge of what machines would do under the conditions in which they were to be employed. It would then be found that certain machines would not need to work to such fine limits or tolerances as others. In radio engineering one very important quantity which was perpetually discussed was signal-to-noise ratio and the method described in the paper would help materially to achieve the desired object.

Engineers' Reaction

MR. K. G. HODGSON (Standard Telephones) said there seemed to be considerable " sales resistance " to the adoption of statistical methods on the part of engineers, partly because statistics was a subject which had been largely neglected in their training, at any rate in this country; it was also, perhaps, partly due to the fact that some of the terminology was, at first, rather liable to lead to trouble. The idea of " probability " to a man who was accustomed to dealing with definite things was rather a shock. One of the main functions of statistical methods was to obtain the maximum possible amount of information from the smallest possible quantity of data, but some propaganda would be necessary to encourage that idea as distinct from the one which was associated with masses of figures. While, however, the value of statistical methods could not be denied. the idea that all that was necessary was to collect the data and put them into a machine and turn a handle to get the answer would not do. The use by the engineer of statistical methods did not in any way absolve him from exercising his engineering judgment to the fullest possible extent.

MR. E. G. T. EMERY (London Power Co.) dealt with a few aspects of statistical methods which he said he had found presented difficulty and asked if the author could suggest some better methods which did not involve too much calculation. He also criticised the point that the devices mentioned in the paper were applicable only to small samples and expressed the view that, as a general rule, statistics should be based on the whole of the

available data. In the electricity supply industry use was made of the load factor which was the ratio between the half-hourly load and the average of all the half-hourly loads occurring during the period under review. Obviously, the longer the period the more likely it was that an extreme value would be obtained so that the set of weekly load factors occurring in any year were vastly different from the monthly load factors calculated for the same year. The annual load factor, obtained in a similar manner, seemed to bear no relation to either the weekly or monthly values. He suggested that far better statistics than that could be invented.

MR. D. J. DESMOND (J. Lucas, Ltd.) said that by the application of statistical methods to magnetic measurements it was possible to ascertain differences between one operator and another. The results were calculable by a more powerful technique which the author had not mentioned.

MR. G. O. MCLEAN (Edmundsons) considered the paper of such importance that it should have been read before a meeting of the full Institution. He mentioned that E.R.A. had a committee at work on the subject.

The author briefly replied to the discussion and the chairman (DR. W. G. RADLEY) proposed a vote of thanks.

NEW BOOKS

Combustion of Small Coals. Electricity for the Layman.

Problems in the Utilisation of Small Coals. British Coal Utilisation Research Association, Ricket Street, S.W.6. Pp. 294. 15s. 7d., post free.

This book is a reprint of the twenty-eight papers read and discussed before the conference held in London in November, 1943. It also includes the opening address and rapporteur's review for each of the three sessions which covered small coals and slurries, fuels of high inert content and upgrading of fuels. Small coals were defined as those below ¾ in. and the disposal and blending of fines received considerable attention. Among many papers of interest in connection with the generation of electricity is one (by Mr. G. Harper) specifically relating to the burning of coking coals in furnaces designed for dealing with steam coal. In this the adaptations at Croydon power station, more especially in regard to draught distribution, are described, the main problem being to secure complete combustion of a coal of higher calorific value, but containing a higher percentage of fines, than was envisaged in the original design.

These papers possess more than a war-emergency value, as they indicate the lines of further investigations with a view to securing overall efficiency in production and consumption of small coals in order to economise the limited national fuel resources.—C.O.B.

Electricity and Its Application to Civilian and Military Life. By Charles A. Rinde. Pp. xii + 467. George Allen & Unwin, Ltd., 40, Museum Street, W.C.1. Price 25s.

The first glance at the present book was misleading on account of the large number of reproduced photographs dispersed among purely descriptive matter. The wrong impression of a book to meet the popular taste was rapidly removed on reading the contents. The author's purpose is to provide a good working knowledge of the fundamentals of electricity to serve as a foundation for various fields of specialisation of men in the forces and in industry. The reading is made interesting by occasional personal notes, as on Franklin in a useful account of lightning.

A large part of each chapter is devoted to detailed explanations of electrical devices, which serve as an example of the use or control of electricity. These and the working out of many problems give useful information and at the same time arouse the interest of beginners. A few instances of such examples may be cited. The testing and care of storage batteries is described at length. Among the heating effects of an electric current a detailed description is given of detonators and of anti-aircraft searchlights. Ignition systems occupy seven pages, and a whole chapter is devoted to rectifiers. Electrical devices to transmit speech and a description of X-rays, fluorescent lamps and television include manifold applications.

Although every attempt has been made to keep the book as elementary as possible, the principles of work, energy, power are adequately developed. In discussing alternating current, inductance, capacitance, power factor and the like are explained along with their appropriate units. The book is a valiant attempt to give the layman a sound idea of the fundamental principles of electricity and their application, and answering the large number of questions will serve to develop his knowledge.—S.P.S.

Engineering Drawing. By Arthur Cryer, M.I.Mech.E. Fifth edition. Pp. 156. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 7s. 6d.

The fact that this work has now reached its fifth edition is evidence of continued popularity and usefulness. The author pays special attention to developing in the student ability to visualise from data supplied the object he is required to draw, and the examples have been carefully graded in stages of difficulty. The notes on the materials used in engineering which formed a valuable feature of previous editions have been entirely rewritten and considerably amplified.—W.R.C.

My Fifty Years in Transport. By A. G. Grundy, M.Inst.T. Pp. 39; illus. Tramway & Railway World Publishing Co., Ltd., 82, Tankerville Road, Streatham, S.W.16. Price 5s. (proceeds to the Red Cross).

The author, until recently transport manager of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board, started work at the age of ten as an errand boy at a confectioner's shop for 1s. 6d. a week. During his fifty-two years in public transport work he has had a difficult climb up the ladder of success, and has witnessed remarkable changes in methods of public transport.

COMMERCE and INDUSTRY

Water Power Company's Rates.

Lochaber Rating Appeal Dismissed

AN appeal by the Lochaber Power Co. against an assessment of its undertaking in Inverness-shire was dismissed by the Edinburgh Valuation Appeal Court on January 24th. The assessed figures were: Gross annual value £216,185 and rateable value £50,668, and the company claimed that these should be £167,182 and £39,183 respectively.

Lord Jamieson said that in 1935 the assessor, valuing the undertaking on the contractors' principle, applied 5 per cent. to the land, 7 per cent. to the building and civil engineering works and 7½ per cent. to the machinery. Upon appeal an overall percentage of 4 was applied and that had stood for nine years. The assessor had then made a new valuation taking account of further developments since 1935 and of the fact that the extended works were now in full production.

His Lordship held that it would be anomalous to apply a different basis of valuation from that adopted for the British Aluminium Co. and similar industrial undertakings and he considered that the assessor was justified in his action. The other members of the court concurred.

London Power Station Labour

At the request of those London councils owning electricity undertakings, the Metropolitan Boroughs Standing Joint Committee has made representations to the Ministry of Fuel and Power regarding the difficulties experienced in electricity undertakings by reason of the progressive deterioration in the labour situation. The Minister has replied that he is fully aware of the difficulties and admits that the position is worse in London than in the provinces. However he expresses the hope that with the help of the Ministry of Labour and the Electricity Commission the undertakings will be able to obtain the labour they require.

Proposed Durham Station

It is reported that the Amenities Committee of the House of Commons has suggested that the proposed new power station at Kepier, Durham City, should be transferred to the Hartlepools. It is understood that both West Hartlepool and Hartlepools Town Councils would co-operate if the station was to be built in their area. The plan to build at Kepier was the subject of an inquiry in December by the Electricity Commissioners and the Ministry of Town and Country Planning.

H.M.V. Post-war Plans

The post-war plans of H.M.V. Household Appliances (The Gramophone Co., Ltd.), preliminary details of which have been received, provide for the manufacture of an extended and attractive range of products, commencing with irons, fires, heaters and kettles, with suitable additions of popular items, re-introducing washing machines and refrigerators, as manufacturing conditions permit. The company aims at manufacturing and distributing on the broadest possible scale and will supply through a small number of approved wholesalers. In addition, a limited number of specialist distributors will be appointed to sell the larger appliances. This change in distribution methods will necessitate the cancelling, one month from February 1st, of all previous trade agreements and contracts covering H.M.V. household appliances.

New Durham Site Proposal.

Miners Against Coalface Electricity

The Council of the Yorkshire Mineworkers' Association has decided to oppose a plan by the colliery owners to introduce electricity at the coalface in the Barnsley Seam at Yorkshire collieries. The Association contends that the plan would increase the danger to mineworkers. Electricity is used in other seams, and is employed to a certain extent in the Barnsley Seam, but up to now has not been allowed at the coalface in the seam.

Principles of Radiolocation

Security reasons have hitherto prevented publication of the essential facts of R.D.F., radiolocation or radar—as it is variously termed. The fundamental principles of the apparatus are now published in the February issue of *Wireless World*, in an article by Dr. R. L. Smith-Rose, Head of the Radio Department of the National Physical Laboratory, which was responsible for the initial experiments in the location of distant objects by radio in this country that subsequently contributed largely to defensive and offensive operations at various stages of the war.

Commercial Refrigeration

The second annual luncheon of the Commercial Electric Refrigeration Association is being held at the Connaught Rooms, London, W.C.2, on February 21st. Mr. E. G. Batt (independent chairman) will preside and the Rt. Hon. A. V. Alexander, C.H., M.P., First Lord of the Admiralty, will be the principal guest.

Insulating Board Prices

The Control of Paper (No. 67) Order, 1945 (S.R. & O. 1945 No. 31, price 1d.), which came into force on January 22nd, increases the maximum prices for electrical insulating board, presspahn boards, etc.

Control of Lac

The Minister of Supply has made the Control of Lac (No. 3) (Revocation) Order, 1945 (S.R. & O. 1945 No. 50, Stationery Office, 1d.), which revokes the Control of Lac (No. 2) Order, 1943. Licences are no longer necessary for the disposal, acquisition and use of lac.

Standard Radio Components

Various War Emergency Specifications in the BS/RC series for radio accessories, which are prepared by the Inter-Service Components Technical Committee, have been periodically issued. A subscription scheme is still in operation whereby those interested in the whole

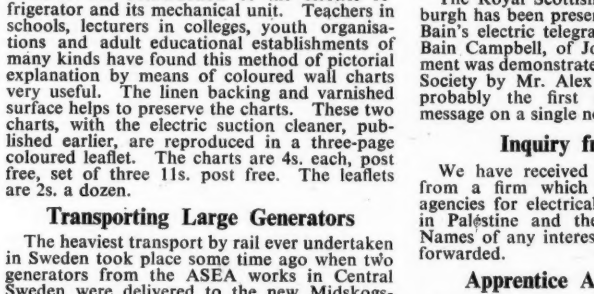
series may automatically receive individual specifications immediately they are published, the index and first sixteen at 6d. and the remainder at 3d. each. Special binders are also obtainable for 4s. each and 15s. for larger type. Orders should be sent to the British Standards Institution, 28, Victoria Street, London, S.W.1.

E.A.W. Educational Charts

Two new charts have been added to the seven existing E.A.W. " How it Works " series. They illustrate the construction of the electric refrigerator and its mechanical unit. Teachers in schools, lecturers in colleges, youth organisations and adult educational establishments of many kinds have found this method of pictorial explanation by means of coloured wall charts very useful. The linen backing and varnished surface helps to preserve the charts. These two charts, with the electric suction cleaner, published earlier, are reproduced in a three-page coloured leaflet. The charts are 4s. each, post free, set of three 11s. post free. The leaflets are 2s. a dozen.

Transporting Large Generators

The heaviest transport by rail ever undertaken in Sweden took place some time ago when two generators from the ASEA works in Central Sweden were delivered to the new Midskogsforsen power station far to the north—a distance of about 300 miles. The *Anglo-Swedish Review* says that six months of investigations and measurements were required before ways and means could be settled and the adaptation of the railway trucks for this special job could begin.



Large rotor rings loaded on special trucks

The generators weighed 510 tons each and had to be dismantled and carried on six specially designed trucks and 33 standard trucks. The transport of the four rotor rings was a particularly difficult problem in view of their diameter (19 ft.) and weight (35 tons each). It was finally decided to transport them suspended in such a way that they could be moved in different directions in order to clear various obstacles along the railway line. Except for some minor mishaps, the transport was successfully carried through; at several places electric cable supports had to be raised as the train passed. The whole transport took place on electrified lines.

Along the final stretch of 40 miles from the rail terminus to the power station the generators were transported on a special highway trailer with a capacity of 100 tons and capable of carrying two rotor rings at a time. Two tractors were required to pull this heavy load.

Bain's Telegraph Receiver

The Royal Scottish Society of Arts in Edinburgh has been presented with the prototype of Bain's electric telegraph receiver from Mr. W. Bain Campbell, of Johannesburg. The instrument was demonstrated at the last meeting of the Society by Mr. Alex Steuart, who said it was probably the first instrument to receive a message on a single needle, over a single wire.

Inquiry from Palestine

We have received from Tel-Aviv a request from a firm which is desirous of securing agencies for electrical apparatus and materials in Palestine and the Middle East generally. Names of any interested manufacturers will be forwarded.

Apprentice Awarded Damages

Damages of £154 were awarded by Lord Keith in the Outer House of the Court of Session, Edinburgh, in an action by an apprentice electrician claiming £500 damages at common law against the Niddrie & Benhar Coal Co., Ltd., owners of the Klondyke pit, Midlothian.

The *Colliery Guardian*, reporting the case, says that Brockie, who worked under the supervision of a qualified electrician, was drilling two holes in the switch panel of a h.v. cable underground on July 22nd, 1943. The drill, after penetrating the panel, made contact with the casing of an ammeter which was charged with electricity and there was an explosion, causing him burns to the face and arms. The electrician, who had left him temporarily two or three minutes before the accident, had not warned him that any danger was involved in the operation. Defendants denied fault and in addition pleaded that the electricity regulations did not apply to owners who did not act in the management of the mine.

Lord Keith held that the allegation of a defective system had not been established and that there was no breach of Regulation 131 (a), but that there was a breach of Regulation 131 (g) in respect that the electricity was not switched off before the operation started, and that as the Regulation imposed an absolute liability on the owners they were liable at common law. He did not consider that Regulation 117 referred to

the very limited class of owners who acted in the management of the mine, nor did he consider that in referring to all mine owners it was *ultra vires*. With regard to the system of work, his Lordship said that it was necessary for an apprentice to obtain practical experience, and the operation was a simple one. It had been suggested that the electricity should have been cut off. This would have stopped work in the whole section of the pit, but if it was thought necessary the electrician should have made application to do this, and he did not.

Luton Electrical Society

Mr. C. T. Melling (borough electrical engineer), the chairman of the Luton Electrical Society, tells us that that body is progressing beyond expectations. For the first session only six meetings were arranged but it soon became apparent that informal meetings were also desirable and subsequently it was decided to form a students' section. A membership of from 60 to 100 was anticipated but it is now already over 200.

There is to be a public lecture in each session; the first one was on fluorescent lighting (with demonstrations) by Mr. C. R. Bicknell, with the chairman of the local Highways, Town Planning and Estates Committee (Councillor C. F. Seaward) presiding. Mr. Melling says that the attendance was such as to make it necessary to look round for greater accommodation for future public lectures.

Weather Causes Fuel Emergency

Unless substantial voluntary cuts in consumption of electricity and gas are made immediately war production will suffer. The Minister of Production, the Rt. Hon. Oliver Lyttelton, stated this week that the demand for electricity was over 50 per cent. above the peacetime level, while that for gas was 13 or 14 per cent up. Industry consumed about 70 per cent. of the electricity produced and domestic and non-industrial consumers about 30 per cent. In the case of gas the ratio was almost exactly the reverse. Consumption had made an all-time record even before the hard winter conditions supervened. The capacity of both electricity and gas undertakings had been strained to the utmost and on several occasions it had been necessary for the Central Board to cut off supplies of electricity.

The present critical situation was due to the exceptional weather which had resulted in what might well reach the equivalent of a week's national production of coal. The loss of production was in some cases due to miners being unable to get to the pits, in others to the pits being completely closed down, and also to the very serious effect which the weather had had on transport.

There was only one cure—curtailment all round. A letter had been sent by Regional Controllers of the Ministry to every plant in the country asking for an all-round economy of at least 10 per cent. in gas and electricity. He stressed that present conditions were imposing a national emergency and if it was not dealt with by concerted effort there would undoubtedly be breakdowns in gas and electricity undertakings which would force him to impose directions which would lead to a fall in war production. The critical situation would not be put right for several weeks from the date that traffic was again normal.

Dealing with the matter as it affected the domestic and non-industrial consumers Major Lloyd George, Minister of Fuel and Power, stated on Monday that if economy could not be obtained there was no alternative but to continue with cutting off electricity and reducing the pressure of gas. For several weeks they had been able to augment by several hundreds the man-power for gas and electricity undertakings and the delivery of coal in London, and several more hundreds were coming in. He was hopeful that with the extra man-power available daily they would be able to deal with the situation in London.

Boston Exhibition

The Boston & District Electric Supply Co., Ltd., recently took part in a Country Life and Country Needs Exhibition organised at Holbeach jointly by the East Elloe R.D.C. and the East Elloe Women's Housing Association. An attractive souvenir brochure issued by the company gave details of the new types of electrical appliances to which the housewife could look forward after the war.

Switchgear Developments

Cooke & Ferguson, Ltd., are holding an exhibition of switchgear at their works this week. Items of particular interest are a 33-kV low oil content outdoor breaker, and a 33-kV indoor air-blast breaker.

Harwich Electricity Showrooms

Harwich Electricity Committee is to lease Victoria House, High Street, Dovercourt, for use as offices, showrooms, demonstration room, etc., after the war.

Calendars

Impressive pictures of some of the larger equipment manufactured by the company appear on the calendar of C. A. Parsons & Co., Ltd., Newcastle-on-Tyne. The large sheets each cover two months.

The calendar of Rhodes, Brydon & Youatt, Ltd., Stockport, has pictures of waterfalls on the monthly tear-off sheets.

Change of Name

F. A. Barber (Electrical Supplies), Ltd., Manchester, have changed their name to S. Wooding (Locks), Ltd.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Manufacturers of FABROLITE switches and lampholders.

Financing Industry

LAST week in the House of Commons, the Chancellor of the Exchequer (Sir John Anderson) announced that it was proposed to set up two finance companies to provide funds for assisting industrial concerns in the post-war period.

The larger of these, the Finance Corporation for Industry, Ltd., would have a capital of £25,000,000, with borrowing powers up to four times that amount. The capital would be subscribed by consortiums of the insurance companies and investment trust companies and by the Bank of England. Its purposes would be to provide temporary or longer-period finance for industrial concerns with a view to their quick rehabilitation and development in the national interest, thereby helping to maintain and increase employment.

The other, smaller, company would be called the Industrial & Commercial Finance Corporation, Ltd. Its capital would be £15,000,000, with borrowing powers of twice that amount. The capital would be found by the clearing and Scottish banks, with a token subscription by the Bank of England. It would supply medium- and long-term capital for small or medium-sized businesses in amounts from, say, £5,000 to £200,000.

Both companies would operate entirely independently of the banks. The larger one would have the assistance of an Industrial Advisory Panel and in order that its policy might conform to the Government's general economic policy it would inform the appropriate Government Departments of the nature and extent of all major developments which it was considering.

Contributory Negligence

LEGISLATION has been introduced into Parliament to amend the law relating to contributory negligence in actions for damages. In the House of Lords on January 23rd the Lord Chancellor (Lord Simon) said that the new measure—the Law Reform (Contributory Negligence) Bill—provided that any person claiming damages for injury would not lose his action if contributory negligence on his part was proved. The Court would be empowered to award him damages in proportion to the extent of the responsibility of the defendant.

A report on this subject as it relates to Workmen's Compensation has been published (Cmd. 6580). It is an interim report of the Departmental Committee on Alternative Remedies. The Committee points out that if the new Bill applied to actions brought by workmen against their employers any partial award of damages might be disadvantageous to a workman who would be precluded from claiming compensation under the Workmen's Compensation Acts. In other cases the employer might be ordered to pay damages in excess of the amount which would be awarded under the Workmen's Compensation Acts. The questions of the negligence of fellow employees and of possible damage suffered by employers are considered.

The Committee recommends that there should be excluded from the Bill :—(*a*) any action brought by a workman or his representatives against his employer claiming damages for breach of the employer's duty to take care of the workman's safety, whether the duty arises at common law or under statute; (*b*) any action brought by a workman or his representatives under the Employers' Liability Act, 1880; and (*c*) any action brought by an employer against his workman claiming damages for any breach of duty committed by the workman in the course of his employment. Actions by workmen against persons other than their employers should not be excluded from the Bill. A provision should be inserted in the Bill empowering the Court, under Section 30 of the Workmen's Compensation Act, 1928, to apportion the blame between the workman and the person other than the employer (or the person claiming an indemnity under Section 6) according to the degree of his fault.

Plant for South Africa

QUOTING a report by Mr. D. J. Hugo, the Pretoria city electrical engineer, on extensions of the city's power station, our Cape Town correspondent stated in our November 17th issue that "the British Government, while authorising the manufacture of all other items of plant, had so far withheld authority for the manufacture of the most essential item, namely, the turbo-alternators." Mr. Hugo's report also said that "Great Britain had already indicated officially that her manufacturing facilities would be fully occupied for some years after the war. Consequently, it might be necessary to procure plant, say, from the United States, with the added complication that at present the future course of rates of exchange was unpredictable."

The Board of Trade informs us that Government permission was given as long ago as September last for the manufacture of the turbo-alternators required at Pretoria and since then the production of a considerable amount of other generating plant for South Africa and other overseas markets has been approved. In addition the placing of several further orders for overseas are only awaiting final details of customers' requirements.

According to *South Africa* (January 20th issue), the Union's High Commissioner in London has stated that the Heavy Electrical Plant Committee has authorised the release of plant with a total capacity of 186,500 kW which is required in the Union by 1947.

In this connection an Electricity Generation and Distribution Advisory Committee has been formed with the collaboration of the Director-General of Supplies, with the objects of co-ordinating the Union's war-time requirements of electricity generating and distribution plant and equipment and, secondly, assessing the Union's post-war requirements of heavy electrical plant. The Committee is at present conducting a survey in order to establish the relative urgency of requirements of the Union's undertakings and will, if necessary, undertake a further survey with a view to determining any other requirements not covered by the authorisation mentioned above.

The members of the Committee are: Chairman, Mr. C. L. F. Borckenhagen (Controller of Building Materials); Mr. P. Furness (Electricity Supply Commission); Colonel G. G. Ewer (Municipal and Public Utilities Building Advisory Committee); and Mr. H. A. Eastman (Association of Municipal Electrical Undertakings of South Africa).

Greenock Raid

Extent of Damage in 1941

AS mentioned last week, during the night of May 6th-7th, 1941, an air raid over the Greenock area did considerable damage to Dellingburn power station and to the h.v. and l.v. cable distribution systems. In this raid Mr. D. McDougall, the chief engineer and manager, lost his life while fire-watching in the power station and the charge engineer on duty suffered severe injury to his arm.

Seven bombs were dropped on or near the power station, two hitting the engine room and causing the roofs of the engine room and boiler-house, and parts of the gable ends, to collapse. Three turbo-alternators, with auxiliary plant, were completely destroyed, as was also the complete h.v. control switchboard, comprising forty-nine panels. Severe damage was also caused to rotary convertor plant, and the cable chamber was gutted by fire.

Above : The C.E.B. substation, with its 40,000 kVA of transforming plant, was put completely out of action
Left: The damaged engine room at Greenock, showing the destroyed control board, platform, etc.

A bomb also dropped in the centre of a 50,000 lb. boiler, completely destroying the whole equipment and causing damage to adjacent boiler units. Another bomb, which fell at the base of one of the chimneys, destroyed about 30 ft. of the main flue, severely damaged the base of the chimney, and caused 20 ft. of the brick-work at the top to collapse. Other plant damaged included the ash suction plant, 36-in. circulating water piping, circulating pumps, h.v. switchgear, buildings, steam and exhaust piping, and two wooden cooling towers were completely destroyed.

Bombs dropped close to three substations, completely destroyed h.v. and l.v. switchgear, transformers, rotary convertors, etc. Damage was done to twenty-six h.v. cables, as well as l.v. distributors, including the disconnection of several hundred services, due to buildings which had been demolished.

With the assistance of squads of riggers, carpenters, etc., lent by the shipbuilders, essential clearances and the temporary erection of housing to protect plant necessary for the resumption of the supply was carried out. Due to the strenuous efforts of the undertaking's employees and technical staff, helped by men and material from the Clyde Valley Electrical Power Company, a partial supply was restored on May 11th, and the full supply, so far as the h.v. cable system was concerned, was available a week later. All

this work was of course more or less of a temporary nature and many months elapsed before permanent reconstruction was completed.

As the power station was out of commission for a considerable time, the undertaking was dependent on a full supply being available from the grid, and, as the grid substation was also put out of action, it was necessary for the Central Electricity Board to install a 20,000-kVA transformer, with control switchgear. This plant was available from the emergency plant pool and was delivered on site, erected, and put into commission in four days.

During the period from May 6th to 10th, when the electricity supply was not available from the power station, arrangements were made with a local sugar refinery to start up its generating plant and from this source an emergency supply was available for the essential services, such as bakers, butchers, etc., situated in the central area of the town.

We are indebted to Mr. W. A. Woodrow, chief engineer and manager of the Greenock undertaking, for the above notes.

Education for Engineers

Second Half of I.E.E. Discussion

THE discussion on part-time further education at technical colleges, including courses for those returning from the Services, at the I.E.E. in London on January 18th (see last issue), was resumed on January 25th. The whole subject is also to be discussed by the Students' Section and there will also be further discussions on various aspects of this report of the Post-war Planning Committee of the I.E.E.

SIR ARTHUR FLEMING, chairman of the Education and Training and Personnel Sub-Committee (No. 1), opened the resumed discussion with a brief review of the principal points raised on the previous occasion. He stressed the nature of the overseas competition which this country was expecting to encounter after the war and the imperative need for personnel with educational and practical attainments much higher than the 1939 standards.

Decision for Industry

Industry must decide what its needs were and should not unfairly throw the burden on the technical colleges. It was also the responsibility of industry to provide the best possible facilities for technical education and to assist in the selection and training of teachers.

He did not think that it would be very difficult to differentiate at an early age between those who were going into the proposed three categories—craftsmen, technicians and professional. Consideration must be had for the basic aptitude of the young man. Those coming into industry should be looked on as the most important raw material which needed developing to the fullest possible extent. That involved applying the aptitude of the individual in the right channels, and the classification laid down in the Report aimed to do that.

There had already been interviews with the Board of Education, the Association of Principals of Technical Institutions and other bodies, and it was hoped, through those conferences to take a definite step forward in the direction which industry really needed.

SIR GEORGE NELSON (English Electric Co., Ltd.) said he felt that industrialists should play a much more prominent part in engineering training and must accept responsibility both during the educational period and afterwards. The actual educational work carried out in the electrical engineering industry was on much too restricted a scale.

Those coming back from the Services should go straight back into the industry and be provided with part-time education. They should not be sent to the technical colleges on full time courses because they might develop an inferiority complex if they had to work in the colleges with youngsters. There must also be the closest possible link between academic training and practical work. He would like to see courses of the sandwich type.

America would be our main competitor in the near future and later on there would probably be two other great economic units with large populations and resources in Russia and China. Unless the British Empire stood together in engineering education it would not be able to compete.

DR. J. GREIG (head of Electrical Engineering Department, Northampton Polytechnic) suggested that the division into the three categories might not be so simple as it seemed. Employers must recognise the importance of craftsmanship courses, and so should the trade unions. It should be possible to have supplementary courses for those who subsequently proved to be suitable for a higher grade.

Importance of Technicians

MR. T. R. GOLDUP (Mullards) said that if the level of technical education was not raised within a reasonable time, industry would have a very hard task if it were successfully to compete in the world's markets. Technicians required a combination of technical skill and general education, and this group was of greater importance, perhaps, than the other

two. He expressed regret that the Report dealt with practical training in only a few paragraphs and suggested that manufacturing organisations which had run their own schools for years would do well to get together and see what could be done to speed up and raise the level of that essential practical training.

Men who had been in the Forces would have practically to re-learn the whole of the manufacturing side. That was a problem which would give industry a great deal of difficulty in solving.

LORD EUSTACE PERCY (King's College) thought that the universities must look to the technical colleges far more in the future for recruitment, for the reason that the lack of machine-mindedness in our young men had prevented the universities from obtaining adequate quantities from the secondary schools. The most valuable and successful of students were often those who had come late into the university from industry.

MR. W. C. S. PHILLIPS (head of the Electrical Engineering Department, Borough Polytechnic) said that individual firms, as distinct from the industry, had taken considerable interest in technical education and in the training of their employees, to the advantage of both the employers and the technical schools. While the training of engineers should be as broad as possible, there was a tendency to introduce too many subjects, and that applied to the courses set out in the Report. The suggested period of 40 weeks training each year, especially if applied to evening classes, would be liable to kill the whole scheme. Even 40 weeks part-time day courses would introduce many difficulties in organisation and administration at technical colleges.

Obligations of Employees

MR. A. H. JACKSON (G.E.C.) emphasised the paramount importance of the economic factors underlying the Report and the necessity of securing orders from abroad. Employers would be bound to see that their expenditure produced some direct return. He did not think employers could expect any reciprocal engagement from the craftsman, but from the technician and the professional engineer there would have to be contractual obligation or agreement and he recommended consideration of that aspect.

MR. C. W. ROBSON (head of the Electrical Engineering Department, South East London Technical Institute) said that the job of educationalists was to try and provide the education most suited to the particular mentality of the individual rather than to try and fit the student for the course. Therefore it was a practical and reasonable solution to segregate students into three groups, obviously on the understanding that there should be easy transfer from one group to another. He suggested that the professional type of examination should be restricted to the technical colleges, while the craftsman's and technician's course would suit the City and Guilds of London Institute.

MR. W. G. BASS (Ferranti, Ltd.) did not think the scheme was on sufficiently solid foundations, because it had been built on primary education. Mathematics was badly taught in elementary schools and the student who was ill equipped in mathematics would not benefit fully from the proposed course. The Institution should enquire into the methods of teaching mathematics in elementary schools and endeavour to secure the support of the Board of Education to obtain such improvements and modifications as were thought necessary.

Students' Section Views

MR. R. V. DARTON (Johnson & Phillips, Ltd., nominated by the London Students' Section Committee) made some suggestions with regard to the proposed courses and emphasised the need for human understanding on the part of those responsible for the direction of students into the three groups and their subsequent transfer to a higher group later, if found necessary. His main point was the need for the introduction of cultural subjects into the syllabus.

BRIGADIER F. T. CHAPMAN (War Office) mentioned that there had been an immense broadening of the subjects included in the title "electrical engineering." There was, therefore, an overwhelming case for some change in training. For instance, greater attention to general science was desirable in the course for professional engineers. In the part-time course there was immense pressure and he suggested that the student should be allowed to finish at a later age than set out in the Report, say at the age of 23. The part-time student would then have nearly as many hours training as the full-time university student. The age for the first National Certificate might be fixed at 18, for the second at 21 and for the third at 23.

DR. S. WHITEHEAD (E.R.A., and Institute of Physics) also expressed regret that more was not said in the Report with regard to the teaching of mathematics and said that he sympathised with the apprentice who had to carry on his studies and earn his living at the same time. There was a greater measure of educational leave if sandwich courses were arranged for six or twelve months at a time than by day leave.

MR. L. W. PHILLIPS (lecturer in Electrical Engineering, Northampton Institute) regarded the Committee's approach to the subject as wrong. The Report was an excellent physiological skeleton but it was not clothed in living flesh and it lacked life. They were deluding themselves in speaking of the craftsman in connection with that scheme. The old craftsman's contact with his material

was a living contact, but there was no living contact between the machine to-day and the individual.

MR. G. F. FREEMAN (head of the Electrical Engineering Department, West Ham Municipal Technical College) viewed the scheme outlined in the Report with the greatest sympathy, but with some misgivings. In the Metropolitan area there were a large number of colleges and students were perplexed at the multifarious number of courses available to them. The result was that they took the subject which interested them in different courses at different colleges, which caused a great deal of trouble in fitting them into the programme and getting the Institution to grant exemptions from certain subjects in their examinations. Some means must be found for remedying this. He thought 40-week courses were too long, if the students were to be given opportunities for recreation and cultural studies.

MR. W. F. GIDDINGS (head of the Electrical Engineering Department, Acton Technical College) also complained that 40 weeks was too long, especially as there were some colleges holding day, evening and week-end classes. It left the staff very little time for the necessary administrative work. Evening classes were an anachronism and part-time education should be part-time day education. Arrangements should be made to give time for the teaching of as many cultural subjects as possible.

MR. K. T. STURLEY (Marconi's) asked why no mention had been made of the student who was directed into industry and had suffered from a very shortened course. He also inquired what plans were being made for facilitating the exchange of technical teachers into industry to assist in development work. The Institution was the right body and perhaps by means of the Professional Engineers' Appointments Bureau something might be achieved.

Committee Member Sums Up

MR. S. E. GOODALL (assistant chief engineer, W. T. Henley's Telegraph Works Co., Ltd., and a member of the Sub-Committee) summed up the discussion. He reassured those who had asked for more consideration to be given to practical work and said it was the intention to ask the Sub-Committee to prepare a further report on that subject. A number of leading firms were very much alive to their responsibility and were preparing to offer more than the Ministry of Education was asking for with regard to part-time day release and to give part-time assistance in the provision from their staffs of lecturers and teachers. He admitted, however, that that was not generally representative of industry.

The Committee had approached the problem of revision of the National Certificate not from the point of view that the National Certificate was failing but rather that it might not be wholly adequate in the coming years to meet the post-war needs of the individual as well as the industry. They had not overlooked the fact that they should be first concerned with providing for each individual man the best possible type of training and education. There was, however, a practical impossibility in modifying the existing National Certificate courses to meet the needs of both the technician and the professional engineer. If the ruling of the Institution with regard to raising the standards of education for professional engineers was accepted—as it must be—and if, at the same time, the National Certificate courses were modified to meet these new conditions, there would be an even higher rate of "mortality" than the deplorably high one which existed to-day.

Electricity Supply in France

From our Paris Correspondent

Our correspondent who escaped from France after the German occupation is again in Paris and this is his first contribution since his return.

FRANCE in general—and Paris in particular—is passing through an electricity crisis. Recently new restrictions have been imposed on the suffering Parisians. Current is cut off at 8.30 a.m. and is resumed for an hour at about 1 p.m., after which it is again discontinued until 5 p.m. In spite of the cuts, however, more is now being consumed in the Paris region than before the war. The remarkable thing is that this electricity is transmitted over the network from the Massif Central hydro-electric plant in spite of the damage done to lines and transformer stations.

The increase in consumption is due to the coal shortage. Many more electric fires are in use and consequently consumption has risen sharply. Unfortunately a cold snap froze the Massif water supply and this created a very difficult situation in the Paris region, especially as the coal supply to the steam plants is uncertain. The freezing of rivers and canals also stopped the transport of coal to the capital and the paucity of rolling stock as well as the shortage of coal for running the trains forced the Compagnie Parisienne de Distribution d Electricité to introduce rigid restrictions. The coal which did reach the capital is said to be of inferior quality and double the amount is needed compared with good quality coal. The situation depends, therefore, upon the weather. It is stated that forty-eight hours after a thaw normal supply can be resumed.

Monsieur Robert Lacoste, Minister of Industrial Production, said recently at Limoges that the nationalisation of electricity production is being studied by a special commission. A certain amount of pressure is being brought to bear on the Government by the Resistance movements. They say that some of the interruptions in supply are due to sabotage engineered by the owners. Already in many cases Government representatives are operating the power plants though they are not nationalised.

Machine Tool Control

Restrictions Relaxed

UNDER the Control of Machine Tools (No. 14) Order (S.R. & O. 1945 No. 56), comprehensive control of machine tools will be replaced by "selective control" applied to scarce types and to the most vital requirements. As from February 1st, it is no longer necessary for an acquirer to obtain a Purchase Certificate before placing an order for any metal-working machine tool or for any measuring instrument or measuring machine coming within the purview of the Machine Tool Control. The production and allocation of scarce types of machine tools will be planned by placing tools in this category on a "Nominated List."

Among the items at present covered by this list are all DC and resistance welding machines, power-operated presses for over 150 tons pressure, lathes over 28 in. swing, and certain types of automatics, borers, gear machinery, grinders, sheet metal and plate working machines. Orders for any of these machines will only be accepted by suppliers under the authority of "Supply Certificates." For all other new machines it will be sufficient for suppliers to advise the Control of the acceptance and completion of orders, and any orders of exceptional importance and urgency will be dealt with by means of "Preferential Delivery Instructions."

It has also been decided that, as from February 1st, new orders for new metal-working machine tools will not be subject to statutory price control. This will permit a reversion to the normal contract conditions applying to most types of engineering equipment. Price control will, however, continue to apply to all firm orders for home and export outstanding at January 31st. The power to re-impose price control if necessary is being retained. The removal of licensing and price control does not apply to woodworking machine tools.

Purchase of Government Surplus

The abolition of licensing for used machine tools will give users greater freedom for the purchase of such Government surplus machines as are not held in reserve for possible war uses. This surplus which as long as the war with Germany lasts is unlikely to be large, is now in the charge of the Machine Tool Control and, as from February 1st, sales from this pool will be on a new price basis fixed at a level favourable to purchasers in order to facilitate the re-equipment of industry. Sales on this new basis will be restricted during February to requirements sponsored by a Government Department. By March 1st, however, the Machine Tool Control will have complete price lists of all available Government surplus machines in at least five disposal centres outside London.

In conjunction with these new control arrangements, an announcement by the Foreign Economic Administration in Washington gives details of the conclusion of negotiations for the sale to Britain of about 58,000 American machine tools delivered to this country under Lend-Lease for a sum of $31,500,000. There will now be no machine tools of American origin in British possession which have not been purchased for cash. The machine tools covered in this sale will continue to be used on war production in Britain as long as the need exists.

Parliamentary News

By our Special Reporter

Fuel Economy

IN the House of Commons on January 23rd, Mr. Gledhill, asked the Minister of Fuel and Power whether in view of the importance of encouraging economy in the use of fuel and power and of the benefits now accruing to electrical power supply authorities under agreements providing for increased charges based on the higher cost of fuel, he would ensure that those authorities passed on to their users the whole of the saving due to their lower consumption, whether or not this saving reduced the cost of the supply taken to an amount less than the minimum charge provided for in their agreement.

Major Lloyd George said he presumed his hon. friend was referring to contracts between electricity supply undertakings and power consumers which provided for a guarantee of minimum consumption or minimum expenditure by the consumer. The terms of these contracts varied considerably and he was afraid that it would be impracticable to give general directions on the lines suggested. If, however, Mr. Gledhill knew of any such contracts which appeared to be causing hardship, he (the Minister) would readily arrange for the Electricity Commissioners to investigate them.

Scottish Hydro-Electric Schemes

Mr. Snadden asked the Secretary of State for Scotland whether persons appointed by him to conduct public inquiries in regard to constructional schemes of the North of Scotland Hydro-Electric Board were instructed to visit the site where the proposed works were to be executed before conducting the inquiry.

Mr. T. Johnston said it was open to a person holding an inquiry into a Constructional Scheme, after giving due notice to the parties, to visit the site of the proposed works, and he thought it must be left to him to decide, having regard to the nature of the scheme and of the objections to it, whether such a visit was necessary.

Electric Fans in Ships

The Parliamentary Secretary to the Ministry of War Transport told Miss Ward that all new merchant ships likely to be sent to the Far East, were fitted either with electric fans, or preferably, where this could be done, with forced draught ventilation. Awnings were also being provided, but owing to shortage of material, double awnings could generally only be given to vessels going to the Persian Gulf. In the case of older ships not already equipped for tropical service, owners were required to make them as suitable as was practicable. This involved the provision of electric fans and awnings, where these were not already on board.

Kenya Railways

On January 24th, Colonel Lyons asked the Secretary of State for the Colonies, whether, with a view to the early development of local resources, any plans had been considered for the gradual electrification of considerable stretches of the western half of the Kenya and Uganda Railway.

Col. O. Stanley said he was not aware that the electrification of any part of the railway was contemplated.

Progress at Belfast

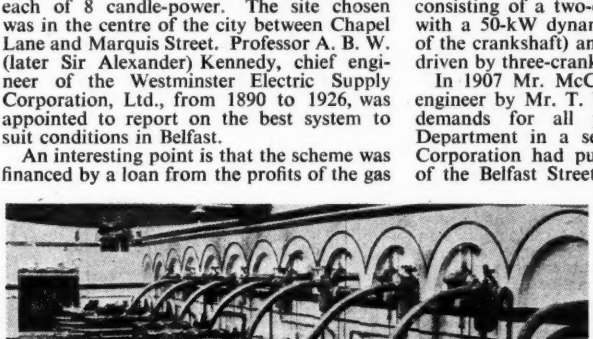
Some Notable Dates

IN October, 1892, a sub-committee of Belfast Corporation which had visited England to inspect electrical installations in the London area and the electrical exhibition at the Crystal Palace recommended the establishment of a plant to supply 10,000 lamps each of 8 candle-power. The site chosen was in the centre of the city between Chapel Lane and Marquis Street. Professor A. B. W. (later Sir Alexander) Kennedy, chief engineer of the Westminster Electric Supply Corporation, Ltd., from 1890 to 1926, was appointed to report on the best system to suit conditions in Belfast.

An interesting point is that the scheme was financed by a loan from the profits of the gas undertaking. Expenditure of £50,000 was provided for, but £32,500 proved ample. In view of the gas interests it is not surprising that a gas-driven station, using town gas, was decided upon. A DC three-wire distribution system was adopted, the voltage between the outer conductors being 220. An Electricity Committee was appointed and Alderman W. J. Pirie (who was created a viscount in 1921) was elected the first chairman, the Committee holding its initial meeting on January 4th, 1894. The first electrical engineer, Mr. V. A. H. McCowen, was appointed in April, 1894, and the supply was inaugurated without public ceremony on January 23rd, 1895. The undertaking has thus completed fifty years' operation, and the story of its rapid progress in that time is told in a handsome illustrated brochure.

The maximum demand in the first year was 159 kW but the total capacity of the Chapel Lane station (427 kW) soon became inadequate. The first section of the new East Bridge Street station was formally opened by Earl Cadogan on October 18th, 1898, the initial installation comprising two 100-kW steam-driven generating sets (each consisting of a two-crank compound engine with a 50-kW dynamo coupled at each end of the crankshaft) and two 200-kW dynamos driven by three-crank compound engines.

In 1907 Mr. McCowen was succeeded as engineer by Mr. T. W. Bloxam. Increasing demands for all purposes involved the Department in a series of extensions (the Corporation had purchased the undertaking of the Belfast Street Tramway Co. in 1904 and electrified it). In 1918 it was decided to proceed with the erection of the Harbour power station, the first pile being driven by Field-Marshal Viscount French on September 11th, 1919.



No. 1 engine room, East Bridge Street station, in 1905

Much more remained to be done on the site when Mr. (now Sir) Johnstone Wright was appointed city electrical engineer and general manager in 1922. The new station was finally opened on August 15th, 1923, by the Duke of Abercorn. The first section comprised two 6,000-kW (which had been housed in a temporary structure since 1920) and one 15,000-kW turbo-alternators, with four 60,000-lb.-per-hr. boilers. Additions were made in 1925 and 1928.

In 1924 generation ceased for a time at the East Bridge Street station and the chimney stacks were utilised by the B.B.C. for the aerial of its local regional transmitter, which was dismantled in 1926.

Under Mr. Wright's direction the undertaking further prospered and a new suite of offices with showrooms was constructed. He left in 1927 to become deputy chief engineer of the C.E.B. and was succeeded by Mr. F. H. Whysall, on whose retirement in March, 1942, the present chief, Mr. W. J. McCaughan Girvan, took office.

By a Special Order of April 16th, 1931, the Corporation's supply area was trebled. The

years 1934, 1936 and 1938 saw further extensions at the Harbour power station (150,000-lb.-per-hr. boilers and 30,000-kW turbo-alternators) and in 1934 the first section of a 33,000-V primary transmission ring was operating and this was completed in 1939.

Finally, the brochure tells the story of the steps taken to safeguard supplies during the war, including the establishment by the Ministry of Commerce of an emergency station at Ballylumford, commissioned on January 1st, 1943, and operated by the Electricity Board for Northern Ireland. From December, 1941, to January, 1944, Mr. Hugh Boyd acted as Controller of the Corporation's undertaking as a war measure. Recently discussions have been proceeding which envisage the setting up of a Northern Ireland Electricity Authority.

The undertaking's area now covers 83 square miles. Out of its profits it has contributed nearly £250,000 to the rates. Last year its revenue was over £1,300,000 and the average price received per kWh sold was 0·913d. Plans for improved coal-handling facilities and another 30,000-kW extension have been submitted to the Ministry of Commerce.

Speaking at a luncheon given by the Electricity Committee to celebrate the jubilee, Councillor Andrew Scott, chairman of the Committee, suggested that the Northern Ireland Government, as well as giving grants towards the building of houses, should consider giving them for the supply of electricity where it is necessary to develop agricultural industry, promote health and provide labour. Councillor Scott said that he was convinced that the proposals for electrical development agreed upon between representatives of the Ministry of Commerce and the Corporation would, if carried into effect, be for the good of the Province. One of the duties of the proposed new authority would be to explore every method, such as the utilisation of waste heat, to increase efficiency and thereby reduce costs to the consumer.

ELECTRICITY SUPPLY

Hornsey Station Closing. Reserves and Charges.

Bingley.—NEW SWITCH-HOUSE.—Sanction has been received from the Electricity Commissioners to an expenditure of £10,000 on a new switch-house, with h.v. switchgear and control panels, which is to be installed near the electricity works. The work is being proceeded with at once, as a matter of urgency.

Brighton. — DOMESTIC APPARATUS. — Many people are coming into the district, frequently to occupy houses where no alternative service to electricity exists, and there is consequently a demand for electrical apparatus. As this cannot be met from existing stocks the Public Utilities Committee is seeking sanction to borrow £5,000 for the purchase of essential apparatus.

Chesterfield. — EXTENSIONS. — Sanction has been obtained by the Electricity Committee to borrow £12,365 for extensions to the Holymoorside area. A supply is also to be provided, at a cost of £1,200, to Boythorpe Colliery.

Croydon.—NEW POWER STATION.—The Electricity Committee reports that the Electricity Commissioners have issued consent to an amended scheme for the establishment of a new power station. As authorised by the Heavy Electrical Plant Committee, it has invited the Metropolitan-Vickers Co. to submit a tender for two 50,000-kW turbo-alternators with ancillary plant.

COOLING WATER.—The Committee is to obtain cooling tower make-up water from a sewage works pond at a cost of £4,948, the pipe line for which is to be constructed by Stewarts & Lloyds at a cost of £2,557.

RATE RELIEF.—It is proposed to allocate £23,000 from the profits of the electricity undertaking for the year to rate relief.

London.—HORNSEY STATION TO BE CLOSED.—Under an arrangement between the London & Home Counties J.E.A. and Hornsey Corporation the latter's power station at Tottenham Lane has been maintained as a stand-by. It is now reported that the station has not been in general use for some time and is not in a condition to be used at all. Moreover, its retention as a stand-by is now no longer necessary and the J.E.A. has decided to inform the Corporation that it no longer requires the station to be kept up for that purpose.

METROPOLITAN COMPANY'S CHARGES.—The J.E.A. has received from the Electricity Commissioners particulars in support of the Metropolitan Electric Supply Co.'s representations with regard to the charges and allowances to be included in the price charged by the company for electricity under Section 12 of the Electricity (Supply) Act, 1926. The Authority has decided to convene a meeting of representatives of the Ealing, Heston and Isleworth, and Maidenhead Corporations, who are affected, to discuss the matter.

WATERWORKS WIRING.—The Metropolitan Water Board is to renew the wiring at its Battersea works at a cost of £250.

DEVELOPMENT AT STOKE NEWINGTON. — A return of probable expenditure at Stoke Newington during the five years following the end of the war gives the cost of substations as £50,000; that of cables, as £55,925; meters, £47,972; apparatus for consumers, £54,340; offices, showrooms, etc., £12,000; and other items £4,000, making a total of £224,237. in all. This is based on certain assumptions regarding housing, conversion of street lighting to electricity, completion of the DC to AC change-over, and freer use of electrical apparatus.

CABLE-LAYING AT ST. PANCRAS.—To enable an alternative e.h.v. supply to be given to three substations, and to meet increased demands in

the neighbourhood, the St. Pancras Electricity and Public Lighting Committee has approved the laying of e.h.v. mains at an estimated cost of £4,990.

North Wales.—COMMISSIONERS' POLICY CRITICISED.—The North Wales & South Cheshire Joint Electricity Authority has passed a resolution "viewing with disfavour" the policy of the Electricity Commissioners in not agreeing to any increase in electricity charges if in their opinion the reserve fund of the undertaking concerned is of a reasonable amount. The J.E.A. considers that to require an undertaking to resort to the reserve fund to meet trading losses is not in the best interests of the post-war development of electricity, and that "cheap units" contribute to an excessive use of electricity during the peak hours, which is not in the national interest. These views will be submitted to a conference of Joint Electricity Authorities and Joint Boards.

Oban.—SUPPLY TO NEW HOUSES.—It is proposed to purchase cable, switchgear, etc., at an estimated cost of £2,380 to provide a supply to temporary housing schemes.

Oxford.—SERVICES IN TEMPORARY HOUSES.—A paragraph in the Housing Committee's report recorded a resolution that arrangements should be made to supply gas cookers, refrigerators and wash-boilers to temporary houses. At the last meeting of the City Council, however, the chairman of the Committee (Councillor Mrs. M. A. M. White) agreed to a request by Alderman F. G. Blackler that the paragraph should be taken back for further consultation with the Electricity Committee. A report by the city engineer stated that information from the Wessex Electricity Company indicated that there was little difference in running costs between electricity and gas (4s. 5d. against 4s. 3½d. a week for a family of four), but the outlay for all-electric services would be heavier.

Sunderland.—ELECTRICAL COOKING EQUIPMENT.—The Corporation is to install electrical equipment in a school cooking depot at a cost of over £1,600.

Torquay.—BULK SUPPLY TERMS.—A disagreement which has arisen between the Corporation and the Salcombe Gas & Electricity Co. as to bulk supply terms is to be referred to the Electricity Commissioners.

Overseas

Australia.—VICTORIA TO ACQUIRE UNDERTAKINGS.—In October last the electricity undertaking of the Seymour Council was transferred to the State Electricity Commission of Victoria. Speaking at a luncheon to mark the change, Mr. J. G. B. McDonald, Minister in Charge of Electrical Undertakings, said that eventually all electricity undertakings holding franchises would be taken over. Mr. G. G. Jobbins, chairman of the Commission, remarked that there were now 66 county undertakings within the fold, leaving 55 to be "mustered."

HYDRO-ELECTRIC SCHEME.—The New South Wales Government has decided to construct a hydro-electric station at the Wyangala dam. The cost is estimated at £390,000.

SUPPLY IN ADELAIDE.—Satisfactory progress with the construction of the Osborne "B" station was reported by Mr. J. Stanley Murray, chairman of the Adelaide Electric Supply Co., Ltd., in his speech at the company's annual meeting. The first turbo-alternator is due to arrive in March and it is anticipated that the station will be in operation by June, 1946. With regard to the use of Leigh Creek coal, the company had not been able to proceed with tests owing to delay in the shipment of parts of two new boilers for the Osborne "A" station. Experiments had shown that it could not be successfully burned in the existing boilers and the design of the new boilers had been altered so that the coal could be used on the "sandwich" system. The Government's latest proposal was that the coal should be dried at Leigh Creek by the Fleissner process, which would undoubtedly result in the delivery of a higher quality fuel, but the directors were still of the opinion that Leigh Creek coal could not be economically used by the company in competition with N.S.W. coal. In this view it was supported by a report received from one of the highest independent authorities in the country.

Tasmania.—FINANCING PUBLIC WORKS.—A Bill submitted to the House of Assembly provides for an expenditure of £1,356,000 on public works, including £500,000 for the Hydro-Electric Commission and £230,000 for the Transport Commission.

Utilities' War Damage

IT was reported at yesterday's meeting of the London and Home Counties Joint Electricity Authority that a deputation from the Conjoint Conference of Public Utility Associations was received by the Financial Secretary to the Treasury on December 18th, when it was explained that the delay in the introduction of legislation concerning war damage to public utility undertakings had been caused by the difficulty in covering all public utilities, which included not only gas, electricity, and water undertakings, but also railways, docks and harbours, sewers, etc., in one measure. It was also felt by the Treasury that it would be easier to deal with the matter when the risk of further damage from enemy action had been eliminated.

The Government was, however, anxious to introduce legislation as soon as possible, but was forced to take into consideration the congestion of Parliamentary time especially with a general election in prospect in 1945. It was admitted that a large measure of agreement had been reached by the various public utility groups, and if it could be anticipated that its passage would be unimpeded by serious opposition, it was possible that the necessary Bill would be introduced into Parliament during the present Session.

The Conference was informed that, even if it were necessary to defer the introduction of the Bill until after the general election, there was no reason to anticipate that the new Government would not adhere to the principles laid down in the White Paper, and, in particular, those which provided that: (1) Public utilities would be divided into groups. (2) A minimum of 50 per cent. of the damage suffered by each group would be paid by the Treasury. It was acknowledged that the White Paper represented an assurance to the utilities which was not in any way affected by the unavoidable delay which had occurred.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The **Westinghouse Brake & Signal Co., Ltd.,** reports a decrease from £173,274 to £161,894 in the net profit for the year ended September 30th last. Pensions again account for £15,000, while contingencies take £70,000 (£80,000). The dividend is maintained at 14 per cent., leaving £93,872 (£95,544) to be carried forward.

Turner & Newall, Ltd.—Expansion schemes costing £1,500,000 on capital account within the first two years after the war were referred to in a statement presented by Mr. G. P. Dewshurst, the chairman, at the annual general meeting on January 25th. It is anticipated that the company will be able to finance these schemes from its existing resources and no new issue of capital is contemplated.

The **International Combustion Co., Ltd.,** is to pay a final dividend of 15 per cent. (same), plus a cash bonus of 12½ per cent. (10 per cent.), making 32½ per cent. (30 per cent.). The gross profit for the year ended September 30th, at £218,172, is £5,923 more than in the previous year.

The Electrical & Industrial Investment Co., Ltd., from a net profit of £21,881 (against £21,175) has declared a dividend of 12 per cent. on its deferred ordinary stock (same) in respect of 1944.

J. & E. Hall, Ltd., report a net profit of £94,705 for the year ended September 30th last, as compared with £95,036 for the previous year. The ordinary dividend is maintained at 10 per cent. and £81,809 (£63,104) is carried forward.

Tecalemit, Ltd., is again paying a final dividend of 12 per cent., making 18 per cent. for the past year, but the distribution is on an increased capital. The net profit for 1943-44 was £49,911, against £43,843.

The **Yorkshire Electric Power Co., Ltd.,** is to pay a final dividend of 5 per cent., again making 8 per cent. for the year.

New Companies

Trianon Electric, Ltd.—Private company. Registered January 17th. Capital, £2,000. Objects: To carry on the business of manufacturers of, and dealers in, bakelite and electrical goods, radio and gramophone sets and accessories, etc. The subscribers are: Eileen Hawtin, 1, Temple Road, N.W.2, and J. Williamson, 14, Stuart Avenue, W.5. Registered office: 203, Regent Street, W.1.

Goldsbrough & Baker, Ltd.—Private company. Registered January 17th, in Dublin. Capital, £1,500. Objects: To carry on the business of electrical engineers and contractors, broadcasters by wireless and public address apparatus, etc. First directors: H. Goldsbrough, Main Street, Fethard, Co. Tipperary, and R. Baker, O'Rahilly Avenue, Clonmel, Co. Tipperary.

W. T. Dalton (Horsham), Ltd.—Private company. Registered January 19th. Capital, £2,000. Objects: To acquire the business of a radio and electrical engineer and supplier, etc. carried on by W. T. Dalton, at 62, East street, Horsham. Permanent directors: W. T. Dalton, 62, East Street; and M. R. Heron, Godrevy, Richmond Road, both of Horsham. Registered office: 12, Market Square, Horsham, Sussex.

S. E. Homes (Service), Ltd.—Private company. Registered January 18th. Capital, £2,500. Objects: To carry on the business of radio, television and electrical engineers and contractors, etc. Directors: A. G. Lewis and others to be appointed. Registered office: 6, Station Road, Crayford, Kent.

Astrex, Ltd.—Private company. Registered January 11th. Capital, £100. Objects: To carry on the business of manufacturers, wholesalers, importers and exporters of electrical and radio articles, lamps, etc. H. J. Bowden, 176, Northumberland Road, North Harrow, Middlesex, is the first director.

Companies' Returns

Statements of Capital

Sphere Investment Trust, Ltd.—Capital, £1,400,000 in 600,000 preference, 600,000 ordinary and 200,000 unissued shares of £1. Return dated June 2nd (filed September 15th). All preference and ordinary shares taken up. £495,105 paid. £704,895 considered as paid. Mortgages and charges: £600,000.

Woodstock Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated June 1st, 1944 (filed August 30th, 1944). 3,510 shares taken up. £3,510 paid. Mortgages and charges: £3,000.

Mortgages and Charges

Johnson & Tanner, Ltd.—Charge on certain contract moneys, dated January 6th, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £4,000.

General Accessories Co., Ltd.—Satisfaction in full on December 28th, of series of debentures authorised by resolutions of January 16th, 1933, and March 12th, 1937, and registered January 25th, 1933, and March 13th, 1937, securing £5,000 and £7,000 respectively.

Bankruptcies

E. S. Cheatle, radio and electrical dealer, lately carrying on business at 580, Coventry Road, Small Heath, Birmingham, as Apex Radio & Electrical Service.—Application for discharge to be heard at the County Court, Corporation Street, Birmingham, on February 13th.

E. W. Pearson, electrician, 59, Bedford Road, Southport.—Supplemental dividend of 11½d. in the £ payable January 30th, at the offices of the Official Receiver, Hunter Street (Friends' Meeting House), Liverpool, 3.

R. T. H. Brimfield, electrical contractor, lately trading as Richfield Electrical Components, 73-78, High Holborn, London, W.C.1.—Proofs for dividends by February 10th to the trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, W.C.2, Senior Official Receiver.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets have been pursuing a switchback course during the past week. A fairly general fall occurred in some of the shares that have been popular of late with the speculative investor. This applies, of course, amongst others, to shares in companies connected with the radio industry. In these, the great attraction has been, and continues to be, the post-war prospects which open up by reason of post-war television developments. Speculation had bought largely in this department and, for reasons difficult to explain, a mild spasm of apprehension shook the market and brought down prices with a run. The depression was short-lived, however, and the market quickly recovered its poise and its prices.

Timid Holders

The more sedate class of ordinary shares did not escape an infection of flatness which spread through the Stock Exchange. Many falls occurred for no better reason than sympathy with the prevailing tone. On the drop, a little support came in, and this led to sharp recovery from the lowest prices touched. The volume of business has been swollen by nervous selling for the account of genuine holders of shares in a number of industrial companies. These holders deemed it better to take advantage of the comparatively high prices still left after the fall, rather than run the risk of the process going further in the direction of reducing values. A recovery did, however, wipe out a material part of the fall that had been experienced in the earlier part of the week.

Decline and Fall

The heaviness of prices in most markets round the Stock Exchange, to which the gilt-edged department offers an exception, is the main reason for a list of declines in the ordinary shares of the equipment and manufacturing companies. The shares in several cases have surrendered gains which they secured a week or two ago. Ever Ready shares, for example, eased off to 44s., and English Electrics to 57s. In no case has the fall been extensive. It can be said, in fact, that the apparent depression is no more than a reflection of the heaviness which has overhung the House as a whole. A few improvements emerge.

Miscellaneous Matters

General Electric 6½ per cent. preference at 34s. 6d. are 6d. higher, although the ordinary shares have drooped to 98s. 6d. Hopkinsons at 76s. 3d. show a small improvement, and Thorn Electrics at 29s. have gained a few pence. An outstanding feature is a further rise of 7s. 6d. in International Combustions at 7⅝, on the increase in the dividend. Changes of consequence are rare amongst Home electricity ordinary shares. London Electrics have gone back a florin to 28s. 6d.; on the other hand, London Associated Electrics at 26s. 6d. are better on the week, and Llanelly Electric Supply at 27s. 6d. are 1s. higher.

International Telephone & Telegraph shares, which rose 2 points to 27 last week, have gone back to 26. It is said that the company is negotiating for the sale of its Spanish telephone interests; the amount involved is reported to be $70,000,000, about £17½ million. Anglo-Portuguese Telephones are 1s. 6d. down at 28s. Marconi Marines receded to 34s. 6d. Cable & Wireless stocks remain unchanged, but Globe Telegraph Trust ordinary at 41s. are 1s. lower.

International Combustion

The price of International Combustion ordinary shares started this year at 6½ and has risen 22s. 6d. in less than a month. This is explained by the announcement a few days ago of an increase of 2½ per cent. in the dividend, making 32½ per cent. for the year, against 30 per cent. The gross profit has risen considerably. The carry forward is increased by the addition of money previously set aside for taxation and no longer required for that purpose. The company is working to capacity, according to current talk. It has in hand work which is likely to last for several years to come. At the present price, on the increased dividend, the yield comes to 4¼ per cent. on the money.

Westinghouse Brake

Westinghouse Brake shares, it will have been noticed of late, are a consistently firm market. The price has been advancing until now it stands at the highest level reached since 1936. In that year, the price touched £4. The present 76s. is not far short of this and, with persistence of the recent demand, the likelihood of 80s. again being touched is certainly within the picture of possibility. The company manufactures the Westinghouse brake for steam and electrified railways and tramways. In addition, it produces all types of railway signal apparatus, including mechanical, electrical and electro-pneumatic systems.

Dividend Record

The issued capital is £1,122,372 in £1 shares. The year ends with September and for the 1943–4 twelvemonth, 14 per cent. was paid, against 12½ per cent. in the previous year and 10 per cent. for the three years 1939 to 1941 inclusive. Both 1937 and 1938

(*Continued on page* 184)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Jan. 30	Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	12½	12½	63/6	..	3 19 1
British Power and Light	7	7	33/6	..	4 3 10
City of London	7	5½	30/–	..	3 13 4
Clyde Valley	8	8	42/–	..	3 16 0
County of London	8	8	45/–	..	3 11 1
Edmundsons	6	6	32/–	..	3 15 0
Elec. Dis. Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	13½	61/–	..	4 8 6
Elec. Supply Corporation	10	10	51/–	..	3 18 6
Lancs. Light and Power	7½	7½	37/–	..	4 1 1
Llanelly Elec.	6	6	27/6	+1/–	4 7 3
Lond. Assoc. Electric	3	4	26/6	+6d.	3 0 6
London Electric	6	6	28/6	−2/–	4 4 3
Metropolitan E.S.	8	8	44/6	..	3 12 0
Midland Counties	8	8	41/6	..	3 17 0
Mid. Elec. Power	9	9	44/6	..	4 1 0
Newcastle Elec.	7	7	32/–	..	4 7 6
North Eastern Elec.	7	7	35/–	..	4 0 0
Northampton	10	10	50/6	..	3 19 4
Northmet Power	7	7	42/–	..	3 6 8
Richmond Elec.	6	6	26/–	..	4 12 4
Scottish Power	8	8	40/6	..	3 19 0
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	30/–	..	4 13 4
West Devon	5	5	24/6	..	4 1 8
West Glos.	4½	3½	25/–	..	2 16 0
Yorkshire Elec.	8	8	43/–	..	3 14 5
Public Boards					
Central Electricity :					
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	106	..	4 5 0
1963–93	3½	3½	105	..	3 6 8
1974–94	3½	3½	101	..	3 4 4
London Elec. Trans.	2½	2½	98	..	2 11 0
London & Home Counties 1955–75	4½	4½	111	..	4 1 1
Lond. Pass. Trans. Bd.					
A	4½	4½	122½	+1	3 13 6
B	5	5	123½	..	4 1 0
C	3	3½	69	..	4 14 2
West Midlands J.E.A. 1948–68	5	5	106½	..	4 14 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	6/9	..	—
Calcutta Elec.	6*	6*	48/6	..	2 9 6
Cawnpore Elec.	10	7	41/3	..	3 7 9
East African Power	7	7	35/6	..	3 19 0
Jerusalem Elec.	7	5	28/–	−1/–	3 11 5
Kalgoorlie (10/–)	5	5	10/6	..	4 15 3
Madras Elec.	Nil	4	31/6	..	2 10 9
Montreal Power	1½	1½	24½	−½	—
Nigerian Elec.	8	10	37/6	..	5 6 8
Palestine Elec. "A"	5*	5*	38/–	..	2 12 8
Perak Hydro-elec.	6	7	13/–	+6d.	—
Tokyo Elec. 6%	6	6	23½	..	—
Victoria Falls Power	15	15	90/–	..	3 7 7
Whitehall Inv. Pref.	—	6	26/–	..	4 12 4

Company	Dividend Previous	Dividend Last	Middle Price Jan. 30	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord.	10	15	62/–	..	4 16 9
Assoc. Brit. Eng.	6	7	53/9	..	2 12 0
Assoc. Elec. :					
Ord.	10	10	57/3	−9d.	3 10 0
Pref.	8	8	40/–	..	4 0 0
Automatic Tel. & El.	12½	12½	66/3	−⅛	3 15 6
Babcock & Wilcox	11	11	53/6	−6d.	4 2 1
British Aluminium	10	10	46/–	..	4 7 0
British Insul. Ord.	20	20	5⅝	−⅛	3 11 2
British Thermostat (5/–)	18½	18½	21/3	..	4 7 0
British Vac. Cleaner (5/–)	30	30	33/–	..	4 11 0
Brush Ord. (5/–)	8	9	11/–	..	4 1 9
Burco (5/–)	15	15	15/9	−6d.	4 15 3
Callender's	15	20	5¼	−⅛	3 9 9
Chloride Elec. Storage	15	15	87/6	..	3 18 7
Christy Bros.	12½	17½	77/6	..	4 10 2
Cole, E. K. (5/–)	15	20	41/3xd	−1/–	2 8 6
Consolidated Signal	24	27½	6¾	..	4 0 0
Cossor, A. C. (5/–)	7½*	10*	32/–	−6d.	1 11 4
Crabtree (10/–)	17½	17½	44/–	−6d.	3 19 7
Crompton Parkinson Ord. (5/–)	20	22½	34/6	..	3 5 3
De La Rue	35	40	9¾	−⅜	4 3 0
E.M.I. (10/–)	6	8	34/6	−9d.	2 6 4
Elec. Construction	10	12½	63/6	..	3 18 7
Enfield Cable Ord.	12½	12½	63/–	−1/–	3 19 4
English Electric	10	10	57/–	−9d.	3 10 2
Ensign Lamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	54/6	−1/9	1 16 9
Ever Ready (5/–)	40	40	44/–	−1/–	4 11 0
Falk Stadelmann	7½	7½	34/9	−9d.	4 6 2
Ferranti Pref.	7	7	31/9	..	4 8 2
G.E.C. :					
Pref.	6½	6½	34/6	+6d.	3 15 4
Ord.	17½	17½	98/6	+1/–	3 11 2
General Cable (5/–)	15	15	17/–	..	4 8 3
Greenwood & Batley	15	15	48/3	−6d.	6 3 0
Hall Telephone (10/–)	12½	12½	31/–	−6d.	4 0 8
Henley's (5/–)	20	20	27/–	−6d.	3 14 1
4½% Pref.	4½	4½	24/–	..	3 15 0
Hopkinsons	15	17½	76/3	+6d.	4 11 7
India Rubber Pref.	5½	5½	24/–	..	4 11 9
Intl. Combustion	30	32½	7⅞	+⅛	4 5 3
Johnson & Phillips	15	15	76/–	+2/6	3 19 0
Lancashire Dynamo	22½	22½	102/6	..	4 10 0
Laurence, Scott (5/–)	12½	12½	14/3	..	4 8 6
London Elec. Wire	7½	7½	38/–	..	3 19 0
Mather & Platt.	10	10	56/3	−9d.	3 11 2
Metal Industries (B)	8	8½	47/–	−2/–	3 12 6
Met. Elec. Cable Pref.	5½	5½	21/3	..	5 3 6
Mid. Elec. Mfg.	25	25	7⅛	..	3 9 10
Murex	20	20	5⅛	−⅛	3 18 9
Newman Ind. (2/–)	20	20	7/3	..	5 10 0
Philco (2/–)	—	—	14/6	−6d.	—
Power Securities	6	6	29/6	..	4 1 4
Pye Deferred (5/–)	25	25	33/9	..	3 14 0
Ransome & Marles	20	20	87/6	..	4 11 4
Revo (10/–)	17½	17½	44/6	..	3 18 7
Reyrolle	12½	12½	72/6	..	3 9 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Jan. 30	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing (*Continued*)					
Siemens Ord. ..	7½	7½	35/9	−9d.	4 3 10
Strand Elec. (5/–)	10	12½	11/–	−6d.	5 13 8
Switchgear & Cowans (5/–) ..	20	20	20/9	..	4 16 7
T.C.C. (10/–) ..	5	7½	25/–	..	3 0 0
T.C. & M. ..	10	10	57/–	..	3 10 2
TelephoneMfg.(5/–)	9	9	12/–	..	3 15 0
Thorn Elec. (5/–)	20	20	29/–	+3d.	3 9 0
Tube Investments	20	22½	5½	−¼	4 1 10
Vactric (5/–) ..	Nil	22½	17/–	−3d.	6 10 6
Veritys (5/–) ..	7½	7½	9/–	−6d.	4 3 4
WalsallConduits(4/–)	55	55	52/6	..	4 3 10
Ward & Goldstone (5/–)	20	20	30/6	..	3 5 8
WestinghouseBrake	14	14	76/–	..	3 13 8
West, Allen (5/–)	7½	7½	8/9	..	4 5 9
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc. ..	Nil	Nil	6½	..	—
Brit. Elec. Traction:					
Def. Ord. ..	45	45	1205	−10	3 15 0
Pref. Ord. ..	8	8	190	..	4 4 3
Bristol Trams ..	10	10	57/–	..	3 10 2
Brazil Traction ..	1¾	2	26	+¼	7 13 10
Calcutta Trams	6½	7½	64/6	..	2 6 6
Cape Elec. Trams	5	6	26/–	..	4 12 4
Lancs. Transport	10	10	49/–	..	4 1 8
Southern Rly.:					
5% Prefd. ..	5	5	78	−1	6 8 2
5% Pref. ..	5	5	119½	..	4 3 8
T. Tilling ..	10	10	61/6	−1/6	3 5 0
West Riding ..	10	10	49/–	..	4 1 8
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	125xd	..	4 16 0
Def.	1½	1½	30xd	..	5 0 0
Anglo-Portuguese	8	8	28/–	−1/6	5 14 4
Cable & Wireless:					
5¼% Pref. ..	5¼	5¼	118	..	4 13 3
Ord.	4	4	85	..	4 14 2
CanadianMarconi$1	Nil	4cts.	9/3	−3d.	—
Globe Tel. & Tel.:					
Ord.	8¼*	5*	41/–	−1/–	2 8 8
Pref.	6	6	31/–	..	3 17 5
Great Northern Tel. (£10)	Nil	Nil	29	+½	—
Inter. Tel. & Tel.	Nil	Nil	26	−1	—
Marconi-Marine..	7½	7½	34/6	−6d.	4 7 0
Oriental Tel. Ord.	4	4	50/–	+6d.	—
Telephone Props.	Nil	6	20/–	..	6 0 0
Tele. Rentals (5/–)	10	10	12/–	−3d.	4 3 4

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 182)

produced 17½ per cent. Goodwill stands in the balance-sheet at £1 and shares in associated companies are written down to a similar amount. The balance sheet is a strong one and optimism had looked for a further improvement in the dividend. The directors have decided to keep the rate at 14 per cent. for the past year, the net profits showing a decrease of £11,400.

Oriental Telephones

The price of Oriental Telephone ordinary shares has risen to 50s. which, on the face of it, seems to be a high figure for shares on which the dividend is only 4 per cent. less tax. The yield, of course, is negligible. For the year 1940, the dividend was 16 per cent. subject to tax, but for the years 1933 to 1938 inclusive, the company paid an annual 12 per cent. tax-free dividend, reduced to 11½ per cent. tax free for the one year 1939. Two years ago, the preference shares were redeemed at 24s. and a cash bonus of £1 per share was paid to holders of the ordinary shares. The issued ordinary capital is now £570,199.

Tax-Savers

The value of the Oriental Telephone Company's British Government securities at December 31st, 1943, was stated to be £1,149,575, and absorption of the shares has taken place on the expectation, or assumption that the break-up value of Oriental Telephones must be approximately 40s. The item of British Government securities has probably appreciated. In addition, the recent news from the East gives rise to the hope that the Oriental Telephone Co. may once again be operating in Hong Kong, Rangoon and Singapore, as it did previously. The shares are regarded as being purely a post-war proposition, and for this reason suitable for surtax payers who are indifferent to the present yield which they receive from their investments.

Home Rails

The near approach of the Home Railway dividend announcements has failed to galvanise the prices of Home Railway stocks. In fact, Home Rails have moved in the downward direction, and the market is heavy. Southern Railway preferred suffered along with the rest. The price has gone back to 78, at which the yield on the money works out to £6 8s. 2d. per cent. Amongst the junior stocks, Transport "C" maintained its position fairly well at 69. The market looks for a repetition of last year's 3¼ per cent. dividend which, at the present price, allows a yield of 4¾ per cent. on the money. The Board paid 1¼ per cent. as an interim dividend last August, and a few optimists profess to look for an improvement in the final.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. *each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

AUTOMATIC Telephone & Electric Co., Ltd., G. T. Baker and R. Taylor.—" Electrical signalling systems." 11075. July 8th, 1943. (566779.)

British Thomson-Houston Co., Ltd.—" Electric circuit-breakers of the gas-blast type." 21137/43. December 19th, 1942. (566685.) " Electric lamps." 21905/43. January 6th, 1943. (566688.) " Halogenated hydrocarbon compositions." 12108/43. July 29th, 1942. (566712.) " Refrigerating machines." 11013/43. July 7th, 1942. (566749.) " Apparatus for starting electric discharge devices having thermionic cathodes." 6307/43. April 25th, 1942. (566796.)

British Thomson-Houston Co., Ltd., and T. Holme.—" Methods of electrically welding heavy sections of metal." 19367. November 19th, 1943. (566678.)

J. A. Crabtree & Co., Ltd., B. G. Harrison and W. E. Hill.—" Supports for electric cables and the like." 19372. November 19th, 1943. (566679.)

Electric Transmission, Ltd., and K. Dannenberg.—" High tension switches of the oil-break type." 19925. November 29th, 1943. (566681.)

Holophane, Ltd. (Holophane Co., Inc.).—" Luminaires." 21618. December 24th, 1943. (Addition to 561541.) (566720.)

M. Kaufmann, J. W. Hodgkiss and Metropolitan-Vickers Electrical Co., Ltd.—" Electric impedance relay means and in protective equipment for electrical power systems utilising same." 10795. July 2nd, 1943. (566805.)

M. S. Lane.—" Electroplating." 9271. June 9th, 1943. (566776.)

Midland Electric Manufacturing Co., Ltd., and A. W. Vicary.—" Electric tumbler switches." 10968. July 6th, 1943. (566746.) " Electric switches having overload release devices." 10969. July 6th, 1943. (566747.) " Electric switches having overload devices." 10970. July 6th, 1943. (566807.)

Mullard Radio Valve Co., Ltd., and C. E. Maitland.—" Variable electric condensers." 10714. July 1st, 1943. (566703.)

E. J. Perry and W. A. Webb.—" Automatic feed and the adjustment of the carbon arc electrodes of lamps." 9877. June 18th, 1943. (566777.)

Philco Radio & Television Corporation.—" Apparatus for reducing echo effects in picture transmission systems." 7033/43. May 5th, 1942. (566669.)

Philips Electrical Industries of Australia Pty., Ltd.—" Connection block assemblies for electrical wiring purposes." 2384/43. February 6th, 1942. (566759.)

H. L. Pipe.—" Dish-washing machines and the like." 2469. February 10th, 1944. (566690.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Electric panel-boards." 21517. December 23rd, 1943. (566755.)

Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.).—" Manufacture of electron-discharge devices." 4166. March 28th, 1942. (566651.)

Standard Telephones & Cables, Ltd., and E. H. Ullrich.—" Radio communication systems." 4850. April 11th, 1941. (566785.)

Standard Telephones & Cables, Ltd., S. H. Towner and P. A. Childs.—" Electromagnetic relays." 11031. July 7th, 1943. (566778.)

Westinghouse Brake and Signal Co.—" Railway or other traffic control light signals." 34/43. January 1st, 1942. (566731.)

Westinghouse Electric International Co.—" Electric motor control systems." 11622/43. August 11th, 1942. (566750.)

J. A. Wright and Metropolitan-Vickers Electrical Co., Ltd.—" Electric resistance welding machines." 19198. November 17th, 1943. (566677.)

Nationalisation Advocated

IN a speech at a luncheon of the Birmingham Branch of the Electrical Contractors' Association on January 18th, Mr. Walter Higgs, M.P., strongly urged the nationalisation of electricity supply mainly to secure unified tariffs and ensure a supply to rural districts. He alleged that only 10 per cent. of the 300,000 farmers in this country could obtain electricity although they were entitled to a supply on terms similar to those enjoyed by urban dwellers, even if the latter had to pay more. It was his contention that urban industry would benefit from the great demand for equipment that would arise. He did not advocate the nationalisation of all commodities.

The speech has called forth replies in the Birmingham press. Brig.-Gen. Wade H. Hayes, managing director of Edmundsons Electricity Corporation, points out that there are only 164,204 farms of over 50 acres; the remainder of Mr. Higgs' 300,000 are more accurately described as small-holdings which would have no use for the equipment and machinery mentioned by Mr. Higgs. Of these 164,204 a minimum of 35,000 were connected and a similar number would have been added but for the war. Brig.-Gen. Hayes draws attention to the work which his company has done and intends to do.

Mr. C. Heathcock, chairman of the West Midlands J.E.A., and managing director of the Midland Electric Corporation for Power Distribution, Ltd., claims that his company has put into operation most of the desired facilities without claiming statutory guarantees. He says that the electricity supply industry has nothing for which to apologise. With regard to power on the farm he thinks that the case has been overstated; it will probably be found that not more than 8 per cent. of the power required could be provided electrically. The main agricultural operations of ploughing and harrowing, for which tractors are used, represent from 50 to 60 per cent.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—March 1st. Western Australian Government Tender Board. Two 25,000-kW turbo-alternators and condensing plant; boiler-house equipment (boilers, pulverised coal equipment, economisers, feed pumps, air heaters, mechanical draught plant, pipework, buildings, etc.); and 25,000-kW frequency changer.

February 28th. Gladstone Town Council, Queensland. 600-HP (approx.) crude oil engine and alternator (Con. 13/44). Switchboard extension (Con. 14/44). A. E. Axon, consulting engineer, Bank of Australasia Chambers, Queen Street, Brisbane.

April 26th. Melbourne City Council. Electrostatic flue gas dust collecting equipment. Spec. 419. City Electrical Engineer's Office (£1 1s.).

Victorian State Electricity Commission. March 21st. Paper and varnished cambric insulated cable. Spec. 44-45/41.

Gellygaer.—February 3rd. Electricity Department. Indoor and outdoor transformers, kiosk complete with switchgear and accessories, e.h.v. and l.v. cable, overhead line equipment, wood poles. (January 12th.)

Orders Placed

Australia.—Sydney County Council. Accepted. Multi-core control cables for sub-stations, etc. (Spec. 714).—British Insulated Cables, Ltd. (£2,854); Enfield Cable Works (A/sia) Pty., Ltd. (£2,023).

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ancoats.—Rebuilding works, Palmerston Street; P. Cummings, architect, 25, Cross Street, Manchester, 2.

Arnold.—Branch library to be erected at Breck Hill Road; Surveyor's Department, Arnot Hill House, Daybrook, Arnold, Notts.

Bolton.—School kitchen, Smithills Dean School; A. D. Primrose, Ltd., builder, 556, Halliwell, Road.

Brighton.—Additions, Warren Farm Institution (£4,500); borough engineer.

Collyhurst.—Extensions to factory, W. C. Jones, Ltd.; C. Sunter, architect, 6, Meadow Bank, Chorlton-cum-Hardy, Manchester, 21.

Cornwall.—New secondary school, Torpoint; county architect, County Hall, Truro.

Durham.—Additional temporary accommodation at Jarrow Technical School and Evening Institute, Jarrow (£7,400); county architect, 34, Old Elvet, Durham.

Kersal.—Church Hall, Mayfield Road; vicar, St. Paul's Vicarage.

Lancashire.—Central kitchen (1,000 meals) Haydock School site (£3,389); G. & J. Seddon, Ltd., contractors, 3-5, Manchester Road West, Little Hulton.

Lerwick.—New harbour, etc. (£75,000), after the war; R. J. H. Ganson, convener of County of Zetland.

Middlesex.—Extensions, Clare Hall sanatorium (£22,716); county architect.

Newcastle-on-Tyne.—Proposed factory on Coast Road for Smith's Potato Crisps, Ltd.

Northants.—School canteen, and alterations to Girls' High School, Wellingborough (£3,100); J. Perkins, county architect, County Hall, Northampton.

Northen Etchells.—Extensions to Catholic Schools, Woodhouse Lane; Sandy & Norris, architects, 134, Newport Road, Stafford.

Oldham.—New Church, Peel district; Rev. F. P. Royle, St. Ambrose's Vicarage.

Rugeley.—Extensions to hospital for Rugeley and District Hospital Board; Lloyd F. Ward, architect, Lloyd House, Gt. Charles Street, Birmingham.

Shildon (Co. Durham).—Proposed factory on the Dabble Duck Colliery site for Alfred Morris & Co., furriers.

Stockport.—School canteen, Booth Street; L. Yates, borough education architect.

Waddon.—Laboratory, Rothermere Road; Dualloys, Ltd.

Warrington.—Secondary School, Bewsey estate, for R.C. authorities; Finance Board, Archbishop's House, Liverpool.

Whitley and Monkseaton.—Council offices; surveyor, Council Offices, Park Avenue, Whitley Bay.

An Australian E.D.A.?

REPRESENTATIVES of the electrical and radio industry in Australia, at a conference last September, appointed a committee to investigate the setting up of a Federal development organisation. The Committee met in Sydney towards the end of November, with Mr. D. J. Nolan (Sydney County Council) as chairman. It was decided to recommend the formation of a Federal body to be known as the Electrical Development Association of Australia whose objects would be clearly defined to apply only to publicity and other matters incidental or conducive to the development of the use of electricity (including radio). The finances of the Association would be provided equally by supply authorities and the trade. The Committee further recommended that each State should take steps to form a State Development Association with identical objects. It was also decided to invite commercial broadcasting stations to co-operate with the movement on both Federal and State bases.